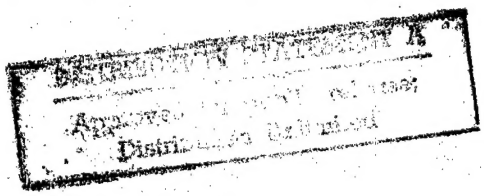
JPRS-UMA-84-040

16 May 1984



# USSR Report

## MILITARY AFFAIRS





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# USSR REPORT
# MILITARY AFFAIRS

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FOREIGN MILITARY AFFAIRS



AFGHANISTAN

ARMED FORCES

LETTERS TO KRASNAYA ZVEZDA EDITOR, RESPONSES

## Housing Deficiencies Corrected

Moscow KRASNAYA ZVEZDA in Russian 27 Mar 84 p 2

[Article: "Following KRASNAYA ZVEZDA Coverage: 'Behind a Pretty Facade'"]

[Text] A critical article by Col A. Drovosekov published by that title on 8 December 1983 told about deficiencies in maintaining and operating housing and about the state of neglect of the grounds of a military compound on one of the posts of the Turkestan Military District.

Acting Post Chief Engr-Col O. Bessarabov informed the editors that the newspaper article had been discussed at a party meeting of the post KECh [billeting unit] and with house management workers, and at a conference of commanders, political workers and officers of the logistical service. The criticism was deemed proper. A plan was drawn up for making civic improvements to the compound and deadlines for performing the work were set. The plan took account of suggestions from compound residents, expressed at a meeting with post officials.

The response signed by Engr-Maj Gen N. Golyshkin, deputy chief of the USSR ministry of defense main billeting and maintenance directorate, states that the gorispolkom was petitioned to assign a plot of land near the compound for transferring personal garages there during 1984. Appropriations were planned for landscaping, lighting and civic improvements, for the construction of children's playgrounds, and for repairing the facades and entrances of residences. Roads in the compound will be restored and the irrigation ditches cleaned after construction is completed on the heating system.

Work on lighting and on organizing clothesline areas has been completed in the compound at the present time, dead trees have been removed and the irrigation system is being put in order.

Fulfillment of the plan for making civic improvements to the compound has been taken under supervision by the USSR ministry of defense main billeting and maintenance directorate.

## Late Newspaper Delivery Problems

Moscow KRASNAYA ZVEZDA in Russian 27 Mar 84 p 2

[Letter by Capt (Ret) B. Kalinskiy, city of Nizhnedevitsk, Voronezh Oblast, and reply by KRASNAYA ZVEZDA correspondent Capt 2d Rank P. Kuznetsov: "In Response to Readers' Signals: Why Didn't the Newspaper Arrive?"]

> [Text] Dear comrades! I turned to the editors for help twice in January of this year. Now I am again forced to write that the delivery of KRASNAYA ZVEZDA to our rayon center subscribers continues to be unsatisfactory. The newspaper arrives at times up to three days late and often 2-3 issues come at once. It is true that you responded that steps supposedly were being taken to improve delivery. I will not argue that this may be the case, only I am convinced that these steps are insufficient.
>
> Capt (Ret) B. Kalinskiy
> City of Nizhnedevitsk,
> Voronezh Oblast

This letter generated justified alarm. It would seem that a great deal already has been done to see that KRASNAYA ZVEZDA subscribers from Voronezh Oblast have an opportunity to read their newspaper on the day it is published. But the reader's third letter showed that the matter was not fully resolved.

A careful check made by the RSFSR main administration of postal communications mail transportation department and by the Voronezh Oblast production-technical administration of communications together with the editors confirmed instances of late newspaper delivery to Nizhnedevitsk subscribers. In fact, 11 (!) times from 18 January through 21 February of this year readers awaited a newspaper for days exclusively because certain workers of the Voronezh mail transportation department were not fulfilling their immediate official duties.

The editors received an announcement about steps taken based on results of the check of acute signals. K. Aliyev, chief of the insurance section of the Voronezh mail transportation department, and his deputy A. Proskuryakova were removed from their positions. A special department order established strict supervision over the dispatch of KRASNAYA ZVEZDA to the oblast's populated points.

Voronezh communicators took an exacting approach to an evaluation of their omissions in work, but the editorial mail unfortunately has other complaints about poor newspaper delivery. "I have been a subscriber of KRASNAYA ZVEZDA for some 30 years," writes reader S. Gurov from Dankov, Lipetsk Oblast. "Previously it arrived on the day it was printed but recently we subscribers have begun to be treated badly. I am 80 years old and at times have to go to the post office and there receive an undelivered issue of the newspaper as a favor."

And here is what S. Postokhodov, chief engineer of an electric lightbulb plant from the city of Mayli-Sai, Kirghiz SSR, tells us: "Last year our scientific-technical library did not receive 35 issues of KRASNAYA ZVEZDA and now the delivery situation is alarming."

The readers' letters indicate that instances of unsatisfactory newspaper delivery to subscribers have become more frequent of late. Prompt and effective steps by the USSR Ministry of Communications are extremely necessary here.

## Comments on Officer's Personal Example

Moscow KRASNAYA ZVEZDA in Russian 28 Mar 84 p 2

[Letter by Capt V. Gerasimov, senior instructor of unit political department: "We Discuss the Letter 'The Officer's Personal Example': Begin with Yourself"]

> [Text] On 20 March KRASNAYA ZVEZDA published a letter from tank battalion commander Gds Maj M. Bogatyrev which raised questions of how to ensure an officer's personal example in service, discipline, and observing the standards of communist morality. The editors are receiving readers' responses to this newspaper presentation and today we publish the first set of readers' letters.

Gds Maj M. Bogatyrev expressed his attitude toward officers who do not set a personal example and who do not value their good name. As a rule such officers are in full view and from one aspect it is easier to influence them to a certain extent since you know the negative points of their character and the deficiencies in their conduct and service. But there also are those who try to put on their best appearance, to show off as the saying goes, although in fact they don't "pull their weight" in work.

Capt V. Fomin, a signal subunit commander, serves in our unit. He loves to speak from the rostrum of party meetings and at official conferences about how well things are going in the subunit with the personnel's training and indoctrination. You listen to him and think about what emotional enthusiasm, what a mood and what a feeling of responsibility the officer has in his work!

But officers of the staff and political department thoroughly studied the state of affairs in the subunit. And what did they find? The results here are not too good. There are substantial deficiencies in arranging the training and indoctrination process and competition and in providing communications to the command post and subunits. When Fomin was told about this he reacted very badly: allegedly demands that were too strict were being placed on him.

But he himself was at fault for many deficiencies. Once we arrived at a class which Capt Fomin was to hold, but recent school graduate Lt P. Korplyakov conducted the class in his place.

"The commander left on urgent matters," he responded to our question.

But as it was learned, Fomin did not have sufficiently substantial grounds for reassigning the class to a subordinate. Moreover, such instances had occurred with him previously as well.

The following fact also indicates Capt Fomin's attitude toward the job. Once a malfunction occurred in the communications equipment in a subunit performing an operational training mission and this was reported immediately to Capt Fomin. It was expected that he would take urgent steps but the officer bestirred himself only toward the following morning, and that after intervention by Maj N. Sheraliyev, the unit deputy chief of staff.

Meanwhile it took only 30 minutes to fix the trouble.

That time we were forced to invite Capt Fomin in to the political department for a thorough and fundamental conversation. We recommended that he revise his attitude toward duty and show more concern for what was assigned him. And soon sharp, just criticism addressed to Party Member Fomin was heard at one of the party meetings.

Of course it is still too early to say that Capt Fomin reorganized his work style and remedied all deficiencies, but there have been positive improvements. This shows once more that everyone benefits from a strict official and party demand.

I would also like to mention how important it is to teach and indoctrinate officers using the example and experience of the best, such as Capt P. Chernyavskiy, a radiotechnical battery commander who performs his military duty in an exemplary manner. He is a straightforward person of principle and demands that young officers begin with themselves in imposing order in the platoons. That is how he too proceeds, and if he sees other deficiencies hindering work or duty he speaks about them boldly without apprehension.

At one time the requests by subunits for adding to the stations' spare tools were being satisfied poorly. It was learned that the reason was the lack of administrative abilities of some officers of the weapon service. At one of the official conferences Capt Chernyavskiy said:

"We cannot be reconciled with sluggishness and an inability to organize in our work, for this affects the quality with which operational training missions are performed."

Chernyavskiy's words touched many to the quick, as the saying goes. His speech was supported by other officers and soon the deficiencies were remedied.

I will emphasize that Capt Chernyavskiy never retreated from difficulties and always finished whatever he started. His authority only grew from this.

That is how I see an officer no matter what post he holds: irreconcilable toward deficiencies in a party manner, with principle and with a crystal-clear soul.

## Comments on Officer Example

Moscow KRASNAYA ZVEZDA in Russian 28 Mar 84 p 2

[Letter by Gds Maj I. Orel, subunit commander: "Demand Strictly and Justly"]

[Text] An officer's personal example in service is inconceivable without his high exactingness toward himself and subordinates. Every officer of course knows this truth, but in practice deviations often occur. Some lieutenants, yesterday's military school graduates, make many mistakes in particular.

There was an incident where Gds Pvt S. Goldobin was late returning from a pass. The private immediately received punishment from his commander Gds Lt Ye. Ragulenko.

Soon the reason for the soldier's tardy return from pass was learned: he assisted militia workers in detaining a criminal. Several days later a letter arrived addressed to the commander in which militia rayon department chief Capt G. Zagornyy asked that Gds Pvt Goldobin be commended. This incident became a good lesson for Ragulenko.

A genuinely exacting commander is at the same time solicitous and sensitive toward people. After having seen to it that a subordinate remedies a deficiency he will find time to chat with him and persuade him how important it is to proceed from the interests of the common cause and the interests of combat readiness in accomplishing any task. Such a pedagogic approach always justifies itself.

I will refer to the experience of Gds Sr Lt A. Belen'kiy, who is a good specialist and commander-indoctrinator. He is able both to place strict demands and to persuade a subordinate as to the sanctity and immutability of regulation demands. That is why things are going very well in Officer Belen'kiy's service. Isn't this a worthy example for emulation?

## Officer's Example Assessed

Moscow KRASNAYA ZVEZDA in Russian 28 Mar 84 p 2

[Letter by Engr-Sr Lt V. Ignat'yev: "Word and Action"]

[Text] Before the beginning of the training year unit officers were heavily burdened with the work of preparing the training facility. Subunit commander Capt V. Shabunin analyzed work progress and updated the tasks.

The conversation with Engr-Lt O. Cherakov turned to a written-off transmitter. The commander wanted to use it as a trainer and asked whether or not Cherakov would cope with this task in the limited amount of time.

The young officer carefully weighed his capabilities and assessed the amount of work.

"The trainer will be ready by the new training year," he told the commander.

The trainer became operational on time and the senior chief commended the young officer.

An officer's word... There is a great, lofty meaning behind this word. Having given your word, keep it; nothing else is possible. Otherwise what kind of indoctrinator of subordinates are you? What will you teach them?

But unfortunately a certain officer promises heaven and earth, as the saying goes, and then doesn't keep his word, alleging circumstances. The job of indoctrinating subordinates thus is dealt great damage, as is, by the way, the authority of the officer himself. It would appear that Gds Maj M. Bogatyrev very properly posed the question about this.

## Commander's Lessons

Moscow KRASNAYA ZVEZDA in Russian 28 Mar 84 p 2

[Letter by Engr-Maj (Res) V. Trifonov: "A Commander's Lessons"]

[Text] Gds Maj M. Bogatyrev raised an important major question in his letter entitled "The Officer's Personal Example." This example is necessary in any matter large or small either on or off duty. In my view a special force of influence is contained in the personal example of a commander who is given absolute responsibility for the training and indoctrination of subordinates and for the combat readiness of a subunit or unit.

Years have passed, but the lessons of air regiment commander Col Yuriy Mikhaylovich Leonov are still alive in my memory. All unit officers learned high exactingness, the culture of behavior, and a solicitous attitude toward people from him.

At one time we regimental engineers were giving a test to flight personnel during retraining on new equipment. We wanted to check the regimental commander's knowledge separately, reasoning that the commander was very burdened with duties, he possibly had not practiced all lessons to the full extent and it would be uncomfortable for him if certain gaps in his schooling showed up in front of all the flight personnel. Learning of our intent, Officer Leonov said:

"I will take the exam on an equal basis with everyone and I ask that you not make any allowances for me. To the contrary, place stricter demands on me than on the others. Remember that I am the commander and it is up to me to go up in a new aircraft first..."

We tested Officer Leonov without any allowances or indulgences, and he demonstrated superb knowledge. All the regiment's pilots received yet another opportunity to see the high measure of responsibility with which the commander approached the solution to problems of personal professional schooling.

Another time the regimental commander invited me and Maj N. Sushchik in to his office. He told us about the difficulties which a young pilot had encountered in mastering the aircraft navigation system.

"I ask that you assist him in training," Officer Leonov said to us.

It was a Saturday and each of us had made his personal plans for the evening. The plans had to be scrapped, but we could not do otherwise: the commander's request was taken as mandatory for execution. We invited the young pilot in to the training building and worked with him until we were sure that he had mastered all lessons firmly and to the full extent.

The regimental commander dropped in to the training building just as we were planning to go home. On learning that the task assigned us had been accomplished he thanked us warmly and sincerely.

Our regiment won the title of outstanding for several years and Col Leonov was awarded the Order "For Service to the Motherland in the USSR Armed Forces" 3d Class. The officers who were his pupils now serve on many air posts and firmly follow all the best they learned from such a wonderful commander.

## Hot Water Leak Decried

Moscow KRASNAYA ZVEZDA in Russian 30 Mar 84 p 4

[Letter to the editors from Sr Lt (Res) N. Dotsenko, Red Banner Pacific Fleet: "Chit-Chat over Steam"]

[Text] Have you had occasion to live on a volcano? No? Well, how about a geyser? No again? It's a pity. Then it will be a bit difficult for you to understand the conditions under which the overwhelming majority of residents of our remote post live.

The whole problem rests on the fact that presently the majority of our homes are located on geysers. No, exotic far-eastern nature has nothing to do with it. All these geysers originated from human hands or, more precisely, they are the product of irresponsible organization called UDOS (officer housing management) for short. Comrade V. Filatov is in charge of this service.

For several years now hot water has been gushing in turbulent streams from the perforated pipes of the heating line, and in numerous spots. Some sections of the heating line are simply exposed on the street and are heating the atmosphere.

It is an impressive picture on freezing days: dense white steam pours from basements and in places from entrances, amazing new residents. How about the old residents? It appears as if they have become reconciled since the perenneal struggle with the housing management has resulted in a zero effect. It is typical that each year management workers solemnly swear and promise at the beginning of summer to prepare worthily for winter, they make higher pledges and they draw up a concentrated plan for these preparations, and each

year one and the same picture is repeated at the beginning of cold weather: repair of the heating line is carried out by one-fifth.

Even the oldest old-timers will not recollect how much hot water has leaked since the first complaint about the post's disgraceful heat supply was written and to what number of offices the numerous complaints went. But no matter what the case, the hot water ran and continues to run. It is true that residents periodically complain to MIS (the naval engineering service) headed by Lt Col A. Vivdich and to the political department, but there has been no perceptible result to this day. The steam poured from the basements and entrances and continues to do so to this day.

And this is why post residents purchase electric fireplaces, stoves and heaters for the winter--everything that can maintain a more or less tolerable temperature in the housing. The overloads which the electrical network is forced to bear lead to frequent outages of the electrical supply to the post as a whole.

But most important is the economic side of this mismanagement. Has anyone thought about this? It seems not.

It is true that conversations about the post's heat supply still are carried on occasionally. The "chit-chat over steam" is particularly lively when there is a hard frost or some commission from the center threatens to arrive. But how long will these conversations remain only conversations?

## Unit Didn't Forward Document

Moscow KRASNAYA ZVEZDA in Russian 30 Mar 84 p 2

[Letter from WO (Praporshchik) R. Pakholyuk, Red Banner Kiev Military District, and commentary: "Steps Taken in Response to Readers' Signals: Although the Matter Has Been Taken Care of..."]

> [Text] Recently I was transferred to a new duty station. As in previous years, I perform the duties of senior aviation mechanic for automatic electronic equipment at the level of a first class specialist. I confirmed my class rating long ago, but the problem is that despite my many reminders, the unit where I previously served has not concerned itself with properly making out the appropriate documents. Am I, a specialist with experience, really being listed today as a novice because of someone's negligence?
>
> WO R. Pakholyuk
> Red Banner Kiev Military
> District

Dear Rostislav Fedosiyevich! We already know that the specialist first class rating has been approved for you. The editors were told this by Engr-Maj Gen V. Ilyushkin, who looked into the question you raised at our request.

It might seem possible to be satisfied with this outcome of the matter but in the official response received by the editors there is for some reason not a word said about steps taken to deprive the red-tapists of tranquility.

## Invalid Denied Automobile, Complains

Moscow KRASNAYA ZVEZDA in Russian 30 Mar 84 p 2

[Letter from Patriotic War invalid M. Nikulin, Donetsk Oblast, and commentary: "Steps Taken in Response to Readers' Signals: A Complaint Repeated"]

> [Text] Believe me, I wouldn't have turned to the editors a second time had I not considered myself to have been avoided. I know the state shows constant concern for us Patriotic War invalids, and I give enormous thanks for this. But it still happens where locally no heed is taken of some of our requests. And I can in no way get them to assign me a passenger vehicle on legitimate grounds.
>
> Patriotic War invalid M.
> Nikulin
> Donetsk Oblast

We agree with you, dear Comrade Nikulin. The difficulties experienced by a Patriotic War invalid should cause special concern for workers of any state establishment to which he comes with a request. And we counted on a display of concern, sympathy and respect when we sent your letter to the UkSSR Ministry of Social Security. As Deputy Minister A. Sologub responded to the editors, that is just the position from which your complaint was examined. The decision was made to provide you with a Zaporozhets automobile gratis.

## Problem with Nursery Placement

Moscow KRASNAYA ZVEZDA in Russian 30 Mar 84 p 2

[Letter from Ye. Kolotova, Izhevsk, and commentary: "Steps Taken in Response to Readers' Signals: A Permit for Alesha"]

> [Text] My husband is performing first-term service and in his absence a joyous event occurred in our family--son Alesha was born. Soon I will be going to work again, but what am I to do with Alesha? He can't be left home alone but it turns out that it is presently no simple matter to get him into a nursery. No matter where I turn, everywhere they tell me to wait.
>
> Ye. Kolotova, Izhevsk

The editors asked M. Zykov, secretary of the Izhevsk CPSU gorkom, to support you, Comrade Kolotova. He recently announced that your son Alesha was issued a permit for a nursery.

## Technician Training Problems

Moscow KRASNAYA ZVEZDA in Russian 31 Mar 84 p 2

[Letter to editors from Sr Lt Tech Serv V. Butuzov, Red Banner Far East Military District, and response by Engr-Maj Gen A. Shelekh, deputy commander for aviation engineering service of Far East Military District aviation, chief engineer of district aviation: "Frankly About Urgent Matters: When is a Technician to Study?"]

[Text] Dear Editors!

Several years already have passed since I completed military school. During my service in air unit "X" I have learned to service aircraft competently and have become a first class specialist. I am entrusted with the most responsible assignments. Nevertheless at times I feel no satisfaction, the reason being that little by little I am losing the store of knowledge I received at school, and not through my own fault.

It probably does not have to be mentioned that aviation specialists must constantly study and augment their knowledge. This is written in appropriate documents and is demanded of us by life itself. Unfortunately in our unit we technicians study only occasionally. We are told that there is no time for planned theoretical studies in the specialty.

Somewhere of course there is good experience in organizing and holding classes with technicians. If possible please tell about this experience in the newspaper pages.

Sr Lt Tech Serv V. Butuzov,
Red Banner Far East Military
District

At the editors' request Engr-Maj Gen A. Shelekh, deputy commander for aviation engineering service of Far East Military District Aviation, chief engineer of district aviation, responds to Sr Lt Tech Serv V. Butuzov:

The issue raised by the letter's author is very current. Today an aviation technician has to have detailed knowledge in many areas, and above all in electronics, electrical equipment and aerodynamics.

Special days are set aside in every aviation subunit for command training. On these days technicians are to familiarize themselves with innovations in weaponry and deepen their theoretical knowledge.

Theoretical training is organized precisely in the majority of our district's air units. Take for example the outstanding air regiment where Engr-Lt Col A. Motriy is the deputy commander for aviation engineering service. The training

process here is arranged in a well-conceived manner. In addition to scheduled command training classes, additional ones are planned and held (in case flying is disrupted by weather conditions). The class topics are determined in advance, which permits monitoring the technicians' training and systematizing their knowledge.

The regiment also makes extensive use of other reserves for deepening the knowledge and improving the professional expertise of technical personnel. For example, aviation specialists here have an opportunity to work directly at the work stations in maintenance teams. Special areas have been organized for this purpose. Theoretical classes are held regularly with technicians in the regiment.

And so where the specialists' training is neglected, it is not a matter of a lack of time as some officials try to prove, but of their personal lack of administrative abilities and their inability to organize a planned training process.

Of course life, flying and exercises make adjustments to plans and we have to be ready for them. It happens where technicians have to work in isolation from the subunit or are absent from scheduled classes for other reasons. But independent training is the primary form of training for officers. A system of individual assignments has become the practice in many subunits of district aviation. Aircraft technicians and technicians in maintenance and periodic technical servicing teams receive specific individual assignments from their superiors to study particular matters, there is strict supervision over the fulfillment of everything planned, and the technical personnel's knowledge is checked systematically.

If officials of the regiment where Sr Lt Tech Serv Butuzov serves displayed greater imagination and determination in fulfilling training plans, then the discrepancies of which the officer writes would not have arisen and the technicians in the squadron would not have had merely to dream about the time when their training would be precisely arranged. I emphasize: in the squadron. The fact is that this regiment, too, has positive experience in arranging the training of technical personnel. For example, classes are held regularly in the technical maintenance unit headed by Engr-Maj V. Liplyanskiy. So that Sr Lt Tech Serv Butuzov's superiors do not have to go far for positive experience; it is quite near.

## Military Commissariat's Deficient Work

Moscow KRASNAYA ZVEZDA in Russian 31 Mar 84 p 2

[Letter from Lt Col F. Makarov with commentary by Lt Col A. Alyab'yev, permanent correspondent for Turkestan Military District: "Acts and Facts"]

[Text] Last year our unit's representatives received replacements in the Andizhan Oblast military commissariat. At such a moment officers from troop units usually become familiar with draftees and receive an impression of their

moral and job qualities and their level of preparation for service. But this time they were not given this opportunity. It was only at the very last minute that they were handed a printed statement about the draftees' readiness to be sent to the troops.

This document, signed by oblast military commissar Col D. Azimov, enumerated many various political indoctrination activities allegedly held with tomorrow's soldiers at the assembly point, right down to a concert.

Military commissariat officers apparently had pondered collectively what activities might have been held with the draftees, they drew up an exhaustive list of them and submitted the material for printing. The handsomely designed statement assures that the draftees underwent medical processing, they were dressed suitably, they had been briefed carefully about their trip, and that they spent time of benefit for indoctrination at the assembly point: they had listened to lectures and briefings. Time allegedly even was found for a random check of the future soldiers in individual norms of the GTO [Ready for Labor and Defense] complex.

As a matter of fact, however, Maj O. Belovitskiy, whom we sent after the replacements, reported that there was barely time to fill out the party. For some reason it contained a youth not subject to the draft because of age and those who were on the roll were late being sent off.

There was a discrepancy between the handsome statement and the facts, to put it mildly. I am not telling this story by chance. The next call-up of young people for active military duty is beginning and much depends on the concerted, coordinated work of unit representatives and military commissariat officers.

Lt Col F. Makarov

Lt Col A. Alyab'yev, our permanent correspondent for the Turkestan Military District, visited the Andizhan Oblast military commissariat. He reports the following:

Together with Lt Col N. Polyakov, a department chief of the oblast military commissariat, I looked over several statements concerning the dispatch of young replacements to troop units. All of them are identical--printed in large numbers in a printing plant. Only the number of draftees is entered. The document reeks of formalism. People in the oblast military commissariat itself agreed with this, admitting that not once had the activities mentioned in the statement been held fully. But they allege that the statement format was not planned by them and the printed text conforms to it.

Previously we had occasion to see documents involving the transfer of draftees to unit representatives in the Fergana Oblast military commissariat. They had both a different format and content. Based on the statement one can judge the age of the draftees, their state of health, educational level, special training and so on. Indoctrinational activities conducted at the assembly point also were entered in the document.

The Andizhan Oblast military commissariat considers the statement unnecessary formal papers. And they present to officers from troop units what can be said to be useless scraps of paper. Lt Col A. Vakhabov, a worker at the Fergana Oblast military commissariat, assumes, however, and not without basis, that the statement is a serious document. It makes it easier for unit representatives to become familiar with the replacements, provides a generalized description of the draftee contingent and indicates the work efficiency of the military commissariat itself.

It is not surprising that Fergana shows more concern in greeting officers arriving for replacements, providing them a place in the hotel and giving them an opportunity to become familiar with the young people being drafted, and that people in Fergana assure that each of tomorrow's soldiers has clothing appropriate to the season and everything he needs en route. In other words, they see the facts and not the statements as being of primary importance.

## Pilots' Professional Psychological Selection

Moscow KRASNAYA ZVEZDA in Russian 31 Mar 84 p 2

[Letter from V. Kamenetskiy and response by Candidate of Medical Sciences Col Med Serv B. Pokrovskiy: "Our Consultation: For Those Wishing to Become Aviators"]

> [Text] Dear editors! I am studying in the tenth grade and am preparing to enter a military aviation school for pilots. I know that a professional psychological selection is conducted there in addition to entrance exams. What is its essence? Is it necessary to make special preparations for this check?
>
> V. Kamenetskiy

> Candidate of Medical Sciences Col Med Serv B. Pokrovskiy answers the reader:

The professional psychological selection for pilot schools, as well as naval schools and a number of other schools, is a unique psychological exam during which special methods are used to study and evaluate the cadet candidate's traits of attention, operative memory, thinking and spatial concepts; reaction time; emotional stability; coordination of movements; and other qualities. This is done in special laboratories after the young man arrives in school and goes through the medical-flight commission. Results of the professional psychological selection are of great importance in being enrolled as a cadet.

Is it necessary to prepare for this unique exam? Of course, although no special preparation is required. You must prepare yourself for the pilot's profession as a whole: develop your will, determination and self-control. For example, perform a daily morning workout, condition your body, and smokers should give up this harmful habit. Physical culture and sports activities provide the most. Athletic games such as basketball, volleyball, soccer and hockey are especially beneficial for the future pilot. It is understandable that one must guard himself against injury in the process.

Comrade Kamenetskiy, if you study well in school and engage in sports regularly you also have the grounds for successfully passing such a test as the professional psychological selection.

## Comments on War Widows

Moscow KRASNAYA ZVEZDA in Russian 31 Mar 84 p 2

[Letter from I. Zubets, first secretary of Novoarkhangelskiy Raykom of CP of Ukraine, Kirovograd Oblast: "The Conversation Continued: No, Soldiers' Widows Are Not Forgotten: They Earned This"]

> [Text] A letter from I. Yefimov entitled "A Word About the Soldier's Widow" was published in the December page of "Dialogue: Reader-Newspaper" (KRASNAYA ZVEZDA, 20 December 1983). The author reflected that women whose husbands died at the front in the Great Patriotic War often are given no attention and that the proper concern is not shown for them.
>
> The reader's letter generated numerous responses and we are publishing two of them.

I will not argue with I. Yefimov, the author of the article "A Word About the Soldier's Widow." Perhaps such a thing happens somewhere... I would like to tell how highly we revere these women who, having lost their husbands or sons, found in themselves the strength to raise up by their labor a national economy plundered by the occupiers, under exceptionally difficult conditions of wartime and postwar times.

Take the village of Podvysokoye, Novoarkhangelskiy Rayon. There were 686 persons who went to the front from here and of them 381 did not return. That means there were that many widows or mothers remaining who lost their husbands or sons.

The first evening gathering dedicated to soldiers' widows never will be forgotten. There were warm and moving words spoken about the widowed kolkhoz members. The fate of each of them is a heroic tale about rear toilers in the war years and in postwar times.

Take Melaniya Andreyevna Plakhotnaya. She was left a widow at a very young age, with six children on her hands. Vanya, the youngest, was six months old and daughter Olya was three years old, and the other four were a little older.

She herself worked conscientiously on the kolkhoz, and she brought up her own children and accustomed them to work.

Another soldier's widow, Ustin'ya Ivanovna Zolzulya, also gave much of her energy and health to restore the kolkhoz economy. She was able to do everything quickly, adroitly and handsomely. She knew no fatigue during the summer harvest, she managed to tie 6-7 piles of sheaves in a day, and she was a driver, milkmaid, groom, and manager of the animal husbandry farm...

And there are tens on hundreds of women like that in the kolkhoz...

It now has become a tradition in the rayon, as well as in our entire Kirovograd Oblast, to honor them everywhere, these courageous women.

In addition to the existing pension, the kolkhoz board presents widows with a monetary grant each month. Other benefits also have been established. In particular, they are assigned free transportation for fuel delivery and are helped with supplies for housing repairs.

We therefore believe that party organizations, local soviets of people's deputies, Komsomol members and Young Pioneers must think about how to beautify the lives of these women by their attitude, sensitivity and attention.

Each year there are fewer and fewer soldiers' widows, as there are frontlinesmen, and we must be even more vigorous in seeking and finding new forms of work with them, of moral support, and of assistance. For example, letters of thanks to soldiers' widows for the children whose work has been recognized on its merit have given a good account of themselves with us.

I believe it was pleasing for P. M. Gaydamaka, a pensioner of the Mir Kolkhoz, to receive the following letter:

"Dear Praskov'ya Mikhaylovna! The rayon committee of the CP of the Ukraine expresses to you, a soldier's widow, sincere gratitude for the good upbringing of your children Andrey Ivanovich and Pavlina Ivanovna, who by their labor are augmenting kolkhoz production and are successfully fulfilling their socialist pledges..."

Today Andrey, the son of widow P. M. Gaydamaka, is the best tractor operator on the kolkhoz and daughter Pavlina is a member of the sugar beet team and a production leader.

The very same letters were received by A. V. Lomaga and many other soldiers' widows of the rayon. Because of their high civic courage these women earned great authority and the respect of our people.

## Grants Established for Widows

Moscow KRASNAYA ZVEZDA in Russian 31 Mar 84 p 2

[Letter from V. Lesnyak, chairman of rural soviet, Great Patriotic War participant, Chernobayevskiy Rayon, Cherkassy Oblast: "The Discussion Continued: No, Soldiers' Widows Are Not Forgotten: Grants Established"]

[Text] Some 400 persons did not return from the war to villages of our Shlyakh Lenina Kolkhoz. Now 116 widows and mothers of deceased frontlinesmen live here. They are promptly provided with fuel, they are given constant attention by the kolkhoz board and the rural soviet ispolkom, and Young Pioneers sponsor them. The question of paying these women 20 rubles each monthly from kolkhoz income in addition to their pensions was examined on the eve of the new year of 1984 at a joint session of the rural soviet ispolkom, the party committee and the kolkhoz board. The meeting of authorized kolkhoz members supported this proposal and approved a statute on additional payment and the list of those for whom this additional payment would be made.

Other kolkhozes and villages of our rayon also show such concern for soldiers' widows.

## Incentive Wages Suffer

Moscow KRASNAYA ZVEZDA in Russian 31 Mar 84 p 2

[Letter from Soviet Army worker I. Simenyuta and commentary by Engr-Col Yu. Zakhlestin, worker of the USSR ministry of defense organizational-planning directorate of capital construction: "A Conflict Situation: It is not a Matter of Specifics"]

[Text] Dear editors! For a short while I, a fifth-category fitter-assembler, have been working in a military construction organization and have been studying in a tekhnikum by correspondence. Our brigade works on a unified order basis. The majority of persons in it are military construction workers and so the brigade's make-up changes periodically. Novices who as a rule do not have skills in construction work come to replace experienced soldiers. Inasmuch as the workers' wages also depend on the output of young soldiers, their insufficiently high qualification hits us in the pocketbook, as the saying goes. Perhaps it is worthwhile to eliminate such a relationship.

And the second question. What benefits do workers have in military construction organizations? In particular, are we authorized additional warm clothing in wintertime?

I. Simenyuta,
Soviet Army worker

The editors asked Engr-Col Yu. Zakhlestin, a worker in the USSR ministry of defense organizational-planning directorate of capital construction, to comment on this letter.

I will answer your second question right away, Ivan Yakovlevich: workers of military construction organizations enjoy all the benefits prescribed by law for builders. The benefits are determined by the nature of labor and the region's features. Unfortunately you did not indicate where your construction site is located, as the envelope only has your home address. If the site at which you are working also is located there, in winter you are authorized felt boots, a warm jacket and warm trousers. But the administration also has the right to issue supplementary funds for acquiring protective gear for installation workers.

Now concerning the question of wages. Brigade forms of labor organization and work on the basis of a unified order are becoming more and more widespread with military builders, as is the case everywhere in the country. Of course, contract brigades at military construction sites have specific features, but the wages there also are figured with consideration of the worker's category, time worked and the labor participation factor. If you and the military builders make up a single brigade, you are responsible together for the end results of work.

In this sense Soviet Army workers are called upon to play the part of mentors for young people and to teach them practical skills. You announce in your letter that you are studying in a construction tekhnikum by correspondence. That means your level of knowledge should be higher than the others. You yourself can do a great deal to see that every soldier in your brigade becomes a master of his work. By the way, such tutorship also has material incentives, and not just directly in the form of pay. The fact is that the better your wards work, the higher will be the collective's end result, which means the higher your personal earnings will be. Herein lies the basic meaning for setting up mixed contract brigades which include workers as tutors, and military builders.

Such brigades are increasing in numbers and their work indicators are considerably higher than in other types of collectives, and this is understandable. The fact is that the experience of seniors and the enthusiasm of young people are harmoniously combined in them, figuratively speaking. It probably also will not be superfluous to mention the enormous moral satisfaction which the tutors receive on seeing the young soldiers standing firmly on their feet and being made into experienced specialists before their eyes and with their help.

## Reservist Housing Problem

Moscow KRASNAYA ZVEZDA in Russian 4 Apr 84 p 2

[Article: "Following KRASNAYA ZVEZDA Coverage: 'After Release to the Reserve'"]

[Text] The article by Lt Col Justice I. Vashkevich published by that title on 11 January discussed the tardy provision of housing to reserve officers and warrant officers [praporshchiki] who chose the city of Tarusu, Kaluga Oblast, for permanent residence after release from the Army.

V. Kiselev, a department chief of the Kaluga CPSU Obkom, informed the editors that the newspaper's presentation was examined at a session of the Tarusu Gorispolkom. The facts stated in the article did occur. Steps were planned to provide housing to reserve officers and warrant officers arriving in the city both along ispolkom lines and on the part of enterprises where they work. The obkom directed the attention of the Tarusskiy party raykom to the need for stepping up supervision of this work.

A response also was received from Lt Col A. Gur'yanov, acting Kaluga Oblast military commissar. He announced that the CPSU obkom, the oblispolkom, as well as all party raykoms and oblast rayispolkoms had been briefed about providing reserve and retired officers and warrant officers [praporshchiki and michmany] with housing in the oblast's cities and settlements. Military commissars were told to give more specific help to officers and warrant officers released to the reserve and to retirement in finding work and housing and in seeing that they fully receive the benefits established for them.

## Reaction to Deficiencies Examined

Moscow KRASNAYA ZVEZDA in Russian 5 Apr 84 p 2

[Article by KRASNAYA ZVEZDA non-T/O&E correspondent Capt 1st Rank (Ret) Ye. Korovin: "In the Wake of a Letter: How the Deficiencies were Divided"]

[Text] Everything began when Sr Lt S. Melikyan arrived at his new duty station--a coastal minesweeper--and discovered on taking over his area of responsibility that his predecessor Sr Lt S. Rodin had neglected the upkeep of equipment and preservation of property, and had shown no concern for prompt additions of spare parts. All this came to light only now. Melikyan immediately reported everything to his superiors.

Here is where the division command element was faced with the question of how to view all this. It would of course be best to take a sharp look at it, as the saying goes, as all exacting, principled managers for whom the important thing is the interest of the matter and not a pretense that all is well ordinarily view shortcomings. But people in the division reasoned as follows: everything was going normally and the minesweepers had given an excellent account of themselves in an important exercise and in competitive minesweeping. There was talk that the unit might be declared foremost in the fleet.

So was it really necessary right at this time to expose their shortcomings for all to see? It would be said that they let the unit down, for if they began to dig to see why the negligence committed by Rodin and his subordinates became possible, they would definitely also shift to questions of the organization of duties and the state of discipline, and not just aboard the ship where Melikyan serves, but in the entire division.

It was decided to wait awhile with conclusions for now. This proved not so simple to do. A statement of acceptance of the area of responsibility, approved by the minesweeper commander, already was lying on the desk of division commander Capt 3d Rank V. Tsaplin. Soon Melikyan's report was appended to it, in which the officer requested that the cost of losses be deducted from those guilty of the negligence.

Something had to be done and what seemed to be a saving idea occurred to the division commander: to return the general statement and compile in its place four new statements, i.e., divide all the detected deficiencies into four parts. In this case each of the statements would appear less impressive. And if they asked why four statements were made from one, one could justify it by saying that it had been divided up according to the purpose of instruments and spare parts.

That is what they did. It remained to decide what to do with the reasons for deficiencies, i.e., with the lack of organization and supervision. It was impossible to divide them or to hush them up. Tsaplin was an experienced person who had served enough time in the fleet, who knew the price of success and who never grumbled if it was necessary to spend days and nights aboard the ships for the sake of success, but he did not stand up under this test, a test of honesty and principle. He just didn't dare admit his omissions and the omissions of other officials and report about them frankly and openly. Of course certain things had been done to remedy the deficiencies. They talked with some officers about what happened, but everything was done so the division's prestige and that of the division commander himself did not "suffer."

I pictured to myself Capt 3d Rank Tsaplin in minutes of lengthy or brief doubts which probably came over him before he decided on this step. I regretted that at that time he didn't have the desire to ponder more deeply the nature of a commander's prestige and recreate in memory all its ideological and moral components with which some people operate so easily in theoretical seminars and which at times are so difficult to put into action. Perhaps in the course of these reflections he also would have arrived at the thought that any glossing over of deficiencies or the presentation of something desirable as fact only degraded this prestige and he would have to pay dearly for this sooner or later.

But at that time Tsaplin had a different point of view and, as subsequent events showed, it also became the point of a further reduction in his exactingness.

The division commander wrote on Melikyan's report:

"Look into it. Report steps taken and your suggestions by 1700." If we consider that by this resolution division navigator Sr Lt V. Bitkov was given less than 24 hours for looking into the report and thinking over suggestions, we can assume that Tsaplin was in a resolute mood. But it is one thing to write resolute resolutions and another to take resolute steps. Strict resolutions only become a weapon of exactingness when a check of execution follows them. A day went by, then another, and more than one week, but the resolution still remained unfulfilled. Meanwhile the red tape involved in taking steps was aggravated by one other very important circumstance: Melikyan was not given tests for authorization for independent performance of his duties. He went to sea repeatedly without an authorization. Everything fortunately turned out without incidents if of course we regard putting to sea without authorization not to be an incident.

Finally Sr Lt Melikyan wrote a letter to KRASNAYA ZVEZDA. He didn't make the letter a secret; he showed it to division navigator Sr Lt Bitkov, who read it and muttered: "Well, that's your affair." He didn't try to dissuade or rebuke, but he also didn't show pleasure: what kind of pleasure could there be--Melikyan had assembled so many deficiencies. He read it and briefed the division commander. Seeing that his request remained ignored, Melikyan wrote yet another report, this time to the unit commander, setting forth approximately the very same as in the letter to the newspaper, and even making reference to the letter. But even this changed nothing. They were not up to that, as training and competition results already were being summarized. The division of minesweepers was awarded an honorary second place.

After this they finally got down to Melikyan's reports. The division commander demanded that certain officers express their opinion about them. The commander of the minesweeper aboard which Sr Lt Melikyan went to sea sat down to write a report. He didn't deny the deficiencies but only stated the facts; he drew no conclusions. Division navigator Sr Lt Bitkov also sat down to write a report. In mentioning one of those sorties when Melikyan performed duties without authorization he reported to the division commander that he allegedly didn't know whether or not the navigator had been authorized for independent control of the department. But he was obligated to know.

When I familiarized myself with these documents and met with officers in checking Sr Lt Melikyan's letter on the editors' assignment, I got the impression that some in the division continued to figure on somehow glossing over the acuteness of problems which had been uncovered. The people I spoke with talked about many issues, and for some reason just one thing was left aside: how everything that happened affected the moral atmosphere in the collective, the officers' indoctrination and the indoctrination of that same Melikyan.

One day division commander Capt 3d Rank Tsaplin informed me that the extent of the deficiencies identified in the navigation department during the turnover of affairs and the amount of damage done by those guilty of negligence and mismanagement had been clarified. "We compared certain data," said the division commander, "and learned that something can be written off for expiration of service life."

It must be noted that the "clarification" was a major one. It is true that it still was necessary to go to different echelons, settle many still unresolved issues and again recompile the statements... I had the automatic thought (not with irony but with bitterness): what exhausting work this is, to slur over deficiencies. How much strength, energy and enterprise it takes. All this should be turned toward good deeds!

Of course, this protracted story finally will come to a natural end. Necessary administrative and party steps probably will be taken and the material and moral costs will be determined exactly. But it is apparent that we must begin by developing the people's proper view of the state of affairs and in particular with the recognition that dividing one statement about uncovered deficiencies into four has absolutely nothing to do with it. Deficiencies aren't divided by any number. There always is a remainder, figuratively speaking. But the important thing in a loss is the work, and above all the work of indoctrinating people.

## Response to Unauthorized Logging

Moscow KRASNAYA ZVEZDA in Russian 6 Apr 84 p 2

[Article: "Following KRASNAYA ZVEZDA Coverage: 'A Strict Accounting is Necessary'"]

[Text] The article by Col A. Drovosekov published under that title on 8 February told about the willful cutting and cluttering of the forest by servicemen of some posts of the Moscow Military District.

A response signed by Lt Gen B. Plotnikov, first deputy commander of the district, states that administrative investigations had been held on all facts cited in the article.

By order of the district commander, Lt Col V. Kotov and Capt V. Stepanyuk were reprimanded for permitting the illegal logging. Ninety-six rubles each was recovered in partial compensation for the damage. Col G. Gusev was admonished and Lt Col V. Lunkin, a department chief of the district KEU [billeting directorate], was reprimanded for lack of promptness in placing the assigned territory in order. Engr-Maj Gen Ye. Kulagin, deputy district commander for construction and troop billeting, and district KEU chief Engr-Col N. Kotylev had their attention directed to the need for reinforcing supervision over fulfilling requirements of guidance documents on environmental protection.

## Military Commissar's Official Misconduct

Moscow KRASNAYA ZVEZDA in Russian 6 Apr 84 p 2

[Article: "Following KRASNAYA ZVEZDA Coverage: '"Contractors" from the Military Commissariat'"]

[Text] That was the title of a letter published on 17 December 1983 from Maj Justice S. Peutin, deputy military procurator of the Samarkand Post. It

discussed official misconduct on the part of the Bagishmalskiy Rayon military commissar, Lt Col B. Ruziyev.

As the editors were informed by Samarkand Oblast Military Commissar Lt Col B. Radzhabov, Lt Col Ruziyev had been held accountable for disciplinary and party liability. He was relieved of his position by order of the Turkestan Military District commander.

## New Recruits' Supervision Criticized

Moscow KRASNAYA ZVEZDA in Russian 10 Apr 84 p 4

[Letter from Maj (Res) D. Shamatovskiy and commentary by Maj Gen S. Beznoshchenko, MoSSR Military Commissar: "Letter with Commentary: Not for the Season"]

[Text] In December of last year I had occasion to travel on a train with a party of draftees. To this day the feeling of bewilderment and concern which that meeting caused has not left me. The fact is that despite the cold weather the young people were dressed too lightly and some were even without caps. It is not surprising that some of them were coughing. When the lads sat down to have a bite, not all of them had cups or spoons... Just how can draftees be sent on a long and very responsible trip so inconsiderately? Why didn't anyone suggest to the future soldiers at some time what they would have to have along, and why didn't anyone monitor their outfitting when they reported to the draft point? Judging from everything, the young lads I saw were traveling from Moldavia.

Maj (Res) D. Shamatovskiy

Maj S. Beznoshchenko, military commissar of Moldavian SSR, comments on this letter at the editors' request.

The alarm expressed by the reserve officer is easily understood. At each draft the units await young people who are healthy and ready to join immediately in performing service obligations, but with that outfitting some of the draftees can end up in the hospital right away.

To avoid such cases military commissariats are obligated to inform the future soldiers of the clothing and footwear in which they are to arrive for being sent to troop units and what they are to have with them. This is also mentioned in an announcement which each draftee receives. All of them must be dressed for the season and with consideration of the climatic conditions of the areas to which they are being sent. They must have a suitcase or duffel bag along, containing an extra set of underwear, a towel, toilet accessories, as well as a spoon and cup.

As a rule, that is what happens. Military commissariat officers inspect the completeness of suitcases and duffel bags and if necessary they help the draftees acquire the articles which are lacking. Nevertheless instances where some young people arrive in military commissariats often without what is most

needed for a trip still have not been eliminated. It happens that even no time remains to send the draftee back home for the missing articles. Maj (Res) Shamatovskiy probably saw some of those undisciplined young people on the train.

Such facts unquestionably also indicate our omissions in working with the people. For this reason the reserve officer's letter was discussed at a special conference of republic military commissariat workers immediately responsible for forming the parties of conscripts. Instructions on stepping up supervision over the proper outfitting of draftees have been given to all rayon and city military commissars.

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Moscow TYL I SNABZHENIYE SOVETSKIKH VOORUZHENNYKH SIL in Russian No 2, Feb 84 (signed to press 10 Feb 84) p 2

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Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 1, Jan 84 (signed to press 5 Jan 84) pp 1-2

Articles by Soviet authors and the chronicle were prepared from materials of the foreign press. The issue used illustrations from the reference work "Jane's," from the brochure "South Korea's Armed Forces," and from the journals: AVIATION WEEK AND SPACE TECHNOLOGY, ARMADA, ARMY, ARMY TIMES, WEHRTECHNIK, DEFENSE, INTERNATIONAL DEFENSE REVIEW, NATIONAL DEFENSE, FLIGHT and ASIAN AVIATION.



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## PRESENT THRUST OF NATO TRAINING EXERCISES DISCUSSED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 1, Jan 84 (signed to press 5 Jan 84) pp 14-20

[Article by Lt Col V. Viktorov: "The Direction of Operational and Combat Training of NATO Joint Armed Forces"; passages rendered in all capital letters printed in boldface in source]

[Text] The present-day international situation is characterized by a sharp, intense opposition of two opposite social systems, two political courses and two ideologies--socialism and capitalism. An extreme right wing of the monopolistic bourgeoisie, which views military force as a universal means for solving all controversial problems, is gaining the upper hand in leading capitalist countries. The destruction of Lebanon's mountain villages by ship guns of the American Sixth Fleet, the landing of an airborne and amphibious force and the U.S. militarists' reprisals against the peaceful residents of Grenada, seizure of the Malvinas (Falkland) Islands by British troops, armed intervention by the United States and France in the internal affairs of Chad, and the undeclared war against nations of Afghanistan and Nicaragua represent a far from complete list of imperialism's piratic actions of late. "The American military presence thousands of kilometers from U.S. territory is being expanded under all kinds of far-fetched pretexts. Springboards are being set up for direct intervention into the affairs of other states with the help of armed force and for employing American weapons against any other country which rejects Washington's diktat," emphasized the Statement by CPSU **Central Committee General Secretary, Chairman of the USSR Supreme Soviet Presidium Yu. V.** Andropov. Other NATO countries are being drawn more and more into carrying out the dangerous plans of the U.S. administration.

Since the early 1980's the leadership of the North Atlantic Alliance has begun in real earnest to carry out its long-term militaristic program, the objective of which is to achieve a "decisive" military superiority over countries of the socialist community in the next decade. The program takes in all spheres of NATO activity and its material base is to be the steady growth of military expenditures by participating countries, the economy's total subordination to needs of the military-industrial complex, and use of the latest achievements of science and technology for militaristic purposes. Realization of the program's basic provisions is aimed at achieving a significant growth of the bloc's military potential through a quality leap in means of warfare,

comprehensive automation of command and control processes, and an improvement in the NATO infrastructure.

While stepping up preparations for a world nuclear war in recent years, the U.S. and NATO leaders at the same time also have been orienting the North Atlantic Alliance's Joint Armed Forces toward conducting a limited war within the limits of the European continent, and they have been attempting to lead public opinion astray relative to their aggressive plans and to conceal the probable consequences of a future war. Also manifested here is the U.S. desire to restrict the possible armed conflict between the two opposing systems--capitalism and socialism--to the European framework, i.e., conduct a war using only two components of NATO's triad: nuclear forces in the theater of war and general-purpose forces, without resorting to the use of American strategic offensive forces. Such actions by the Reagan administration are believed by some foreign specialists to be caused by the presence of parity between the USSR and United States in strategic nuclear forces, which forces that administration to seek ways for preserving the threat of unleashing a nuclear war against countries of the socialist community as a means of attaining hegemonic goals on the one hand and, on the other hand, for precluding the possibility of the enemy delivering a retaliatory strike which, in the admission of American officials, might destroy the country as a "viable society."

In attempting to divert a retaliatory nuclear strike from its country, the American administration is turning Western Europe into a nuclear hostage of the United States. In viewing a "limited" nuclear war in Europe as the most likely and focusing primary attention of staffs and troops on preparing for it, the bloc command attaches great importance to the development not only of nuclear attack weapons, but of conventional weapons as well.

All this determines to a considerable extent the general direction of operational and combat training as one of the most important links in the chain of NATO's aggressive militaristic preparations. It represents a set of measures being carried out by joint and national commands to keep staffs and troops in constant readiness to conduct active combat operations, to improve their ground, air, and naval schooling, and to make a practical check of and work out new forms and methods of warfare.

Over the last 2-3 years the operational and combat training of NATO's Joint Armed Forces (OVS) has been organized and conducted in accordance with basic provisions of the coalition military strategy of "flexible response" and the concept of "forward lines." Primary attention in preparing staffs and troops was given to testing new theoretical provisions connected with immediate preparation, unleashing and conduct of an aggressive war in Europe against Warsaw Pact states with the use of nuclear and chemical weapons as well as conventional weapons.

Judging from foreign press reports, the planning and organization of operational and combat training of the bloc OVS was carried out under general bloc and national plans of the member countries. This training was conducted in the form of troop, naval, air, command and staff, and special exercises, military games, drills, combat readiness tests, various kinds of management

conferences and gatherings, competitions, and officer courses at the level of the entire NATO "zone of responsibility," theaters of war, TVD [theater of military operations], operational formations [ob"yedineniye] (army groups and equivalent formations), large units [soyedineniye] and units [chast'].

As the foreign press reports, the preparation for these activities included long-range, preliminary and detailed planning in accordance with NATO's established procedure for drawing up documents within the framework of a four-year cycle. In the first phase (3-4 years before the beginning of an exercise) tentative lists of information were compiled about the make-up of its participants and sample time periods for conducting it. Basic documentation would be drawn up during preliminary planning (two years ahead), which defined the concept and initial situation. Detailed planning (a year before the exercise) covered the processing of all remaining materials needed for conducting the exercise, familiarization of the participants with the plan and problems to be practiced, and a determination of the make-up of the staff in charge.

Both the actual international relations and relations forecast for the near future would be considered in developing the initial situation for holding major exercises; this permitted the NATO command to play out different versions for unleashing and conducting war. Specific groupings of Warsaw Pact member troops usually would be perceived as the "enemy." In a number of cases the troops acting as the "enemy" function according to Soviet military regulations and manuals, and used some models of weapons and uniforms adopted in armies of the probable enemy. NATO generals thus attempted to emphasize the political direction of operational and combat training, give it an antisoviet and antisocialist nature and bring the conduct of exercises closer to actual conditions. The personnel were preparing not for "defense of western civilization" in general, but for an irreconcilable struggle against a very specific enemy. Intensification of the ideological and political aspects of combat training now is being viewed in armies of NATO countries as one of the important ways to solve the problem of improving servicemen's morale.

The organizational aspect of operational and combat training of NATO's OVS was tied in closely with the GENERAL PRINCIPLES accepted in the bloc for organizing and conducting it.

THE COMPREHENSIVE APPROACH TO ORGANIZING OPERATIONAL AND COMBAT TRAINING is reflected in a closer coordination of national and general bloc plans, development of a uniform operational-strategic background for a large number of special exercises, and an increase in the scale of the activities. In addition, civilian authorities and various organizations have begun to be included more widely in them. This, as foreign specialists believe, allows conducting comprehensive preparation of NATO countries for war, i.e., solving political and economic problems along with military problems.

INTEGRATION OF ALL OPERATIONAL ACTIVITIES CONDUCTED UNDER NATIONAL PLANS AND WITHIN THE NATO FRAMEWORK WITH THE LEADING ROLE PLAYED BY JOINT COMMANDS. All exercises by large units and units of national armed forces were drawn up with consideration of overall NATO plans for operational and combat training and they were organized and conducted with immediate control on the part of those

joint commands in which it was planned to use these large units in wartime. In the estimate of western specialists, this principle permits a close tie-in of training problems worked in exercises with actual plans for troop combat employment and thus preparing the staffs, large units and units of national armed forces more purposefully for war. For this same purpose troops primarily train in the areas of their operational assignment or places most approximating them, and they primarily practice those missions which they will have to accomplish under actual combat conditions.

HIGH INTENSITY IN CONDUCTING OPERATIONAL AND COMBAT TRAINING. The essence of this principle consists of the standardization of basic activities organized under NATO plans: the annual conduct of various exercises, games and drills (some 200), with the overwhelming majority of them having specific periodicity, approximately one and the same make-up of participants, a relatively stable character of missions which are accomplished, and specific areas in which they are held. Many exercises take place under the very same codename, which may be retained for a long while. In the opinion of western specialists, this primarily allows a study of the effect of actual changes in the correlation of forces in basic deployment areas of NATO OVS groupings on the nature of missions accomplished by them. Practicing a large number of variants in conducting combat actions during such exercises makes it possible for the bloc command element to constantly update operation plans and make them conform with the actual military-political situation.

While keeping the overall number of exercises in a year almost unchanged, the NATO command at the same time carried out measures to increase the intensity of operational and combat training (expanding the range of participants and conducting them on a multilateral basis). Units and subunits of ground forces in a number of bloc countries were used for a majority of exercises at the level of division and higher.

THE RESEARCH NATURE OF ACTIVITIES. Research performed during various exercises has been aimed at finding the most acceptable forms and methods for implementing plans envisaging an increase in tactical capabilities of the bloc OVS. In this connection, consideration was given in drawing up the plans to changes in the military-political situation on the European continent and in the world as a whole, and in the correlation of forces between opposing troop groupings of NATO and the Warsaw Pact forecast for the near and distant future, and the new kinds of weapons and combat equipment coming into the large units and units also were taken into account. Troop tests of weapon models coming into the units were conducted in practically all large-scale exercises and methods were studied for employing them under extreme conditions, i.e., approximating actual conditions to the maximum extent. During exercises involving troop participation there was a test of the combat effectiveness and efficiency of new organizational structures of large units, units and subunits, and methods of control and their comprehensive support were perfected.

IMPROVEMENT OF OPERATIONAL AND COMBAT TRAINING THROUGH USE OF NEW ACHIEVEMENTS OF SCIENCE AND TECHNOLOGY IN TROOP TRAINING. In training practice this principle has been reflected in the broad use of various kinds of trainers and

simulators permitting the situation in exercises to approximate a combat situation to the maximum extent. Such equipment acquired particular importance during specialist training. For example, a modern electronic system which recreated a difficult air situation with the help of special simulators was used to perfect operator skills in air defense subunits.

A typical feature of the training process in NATO's armed forces was the fact that command and staff exercises, war games and management conferences usually would be held in the winter period, with major troop exercises planned for the latter half of the year. A uniform operational-strategic background was envisaged for the series of fall Autumn Forge maneuvers. They were a final test of troop and staff training and permitted realistic practice of the reinforcement of NATO OVS groupings through the movement of troops from the United States, Great Britain and Canada, mobilization deployment in European countries, and conduct of various operations of the initial period of a war in Europe. In the first phase of the maneuvers plans for converting armed forces from a peacetime to a wartime footing were played out basically by the command and staff method. A number of key deployment problems, including the movement of American troop reinforcements to Europe (Reforger type exercises) was practiced with the actual inclusion of ground forces, aviation and naval forces. The second phase of the maneuvers chiefly played out individual fragments of operations of the initial period of war and solved problems of organizing close coordination among branches of the armed forces.

In analyzing the course of the largest exercises held of late, western specialists note a certain sketchiness in working out methods for unleashing and conducting a limited war in Europe, which consisted of the following. The war begins with the delivery of mass air strikes and the movement of major groupings of ground forces into the attack. For a certain time (approximately 10 days) combat operations are conducted only with conventional weapons. When the objectives set by the NATO leadership cannot be achieved with the use of conventional weapons and with the appearance of the threat of losing a considerable portion of its territory, the use of nuclear weapons also is provided for.

But this does not mean that the bloc's military-political leadership excludes the possibility of employing mass destruction weapons first from the very beginning of the war. The statements of a number of the highest leaders of the North Atlantic Alliance serve as confirmation of this. For example, at a press conference during the bloc's fall Autumn Forge-82 manuevers, American General Rogers, Supreme Allied Commander Europe, declared that the United States and NATO were ready to employ nuclear weapons first against Warsaw Pact countries.

The concept of all exercises tendentiously envisaged that war would be started by Warsaw Pact armed forces. Following a "defensive" concept, NATO troops repulsed the invasion of "enemy" groupings, defeated them in border areas without allowing a significant penetration into the depth of member country territories and then, using strategic reserves, restored the situation on the conditional state border. This technique, widely advertised by the western

press, is intended to lead the public astray by demonstrating the "defensive" functions of the North Atlantic Alliance and the "aggressiveness" of the Warsaw Pact Organization.

In reality even the most general familiarity with the progress of exercises indicates the offensive direction of the NATO troops' combat training. In particular, a trend toward broader practice of offensive actions appeared at the level of the army corps and below when the exercises were conducted. In one of the largest exercises of 1982, for example (troop exercise Starke Wehr of the FRG's 1st Army Corps), the play of combat actions began immediately with the delivery of a counterblow, i.e., actually with a powerful attack grouping numbering 35,000 persons and more than 1,000 tanks and supported by 250 warplanes moving into the offensive.

Foreign specialists believe that the NATO command has begun to employ airborne and amphibious assault forces more widely than before in working out plans to conduct operations. The drop of a force from the American 82d Airborne Division in Europe (forces of up to a brigade actually were used) after a nonstop flight from the United States, which took 10½ hours, was indicative in this respect. Such actions by overseas and NATO generals are nothing more than the Pentagon's demonstration of its readiness for rapid movements of the Rapid Deployment Force to any part of the globe, including the European Theater of War.

Along with the extensive use of assault forces during exercises there was a significant increase in their intensity as well, which showed up above all in the phase-by-phase employment of one and the same formations of airborne troops and marines within the framework of one or even several exercises.

The western press emphasizes that the extensive use of reserve components of member countries for participation in troop exercises, and the FRG's territorial troops above all, has become typical of the combat training. Their units and subunits were assigned the very same missions as the regular units, which indicates the unquestionable growth in tactical capabilities of the territorial troops and the NATO command's intention to employ them as part of the bloc's OVS during a war.

A great deal of attention during joint air force exercises was given to perfecting the system of unified control of operations by air forces and air defense forces and weapons, primarily for winning air supremacy at the very beginning of a war. The bloc command believes that unified control of air force and air defense forces and weapons and their combat actions are inseparably interconnected. It was no coincidence that in the joint air force exercises Cold Fire-83 and Central Enterprise the aircraft of tactical aviation were used for destroying air targets in addition to delivering strikes against ground and sea objectives and accomplished missions jointly with air defense weapons. At the same time air defense forces screened air bases, control points, depots and other air force facilities against air strikes. As the western press emphasizes, the more effectively tactical aviation destroyed "enemy" aircraft on the ground and knocked out his airfields and control systems, the more successfully air defense forces and weapons performed their missions.

In the assessment of foreign specialists, the NATO command's capabilities to control tactical aviation and the air defense forces and weapons will increase considerably with the deployment in Europe of the AWACS long-range radar detection and control system. During exercises this system's aircraft were employed not only for long-range detection of air targets and for control of tactical aviation, but also to perform reconnaissance in the interests of all branches of the armed forces. Situation data were transmitted from aboard the E-3A aircraft automatically to ground radar posts, to operation centers of the joint air defense system, and to command posts of other branches of the armed forces.

A trend toward a certain redistribution of tactical air forces and weapons according to missions accomplished and objectives showed up in working problems of conducting joint combat actions of the air forces and ground forces. In particular, along with an increase in resources allocated to aviation for carrying out missions of interdicting an area of combat actions, a reduction is seen in the number of sorties for direct air support. The western press notes that this is connected on the one hand with the increased firepower of ground force units and on the other hand with requirements of a concept advanced by General Rogers, NATO's supreme allied commander in Europe, of the need for intensifying the "struggle against enemy second echelons and reserves," in the accomplishment of which tactical aviation is given far from a minor role. In conformity with new views of the NATO command (the theory of "defeat in depth"), the use of combat helicopters, airborne assault forces and sabotage-reconnaissance teams was envisaged in addition to tactical aviation in the fight against "enemy" second echelons during exercises. In the future, precision long-range weapon systems will play the primary part in accomplishing this mission.

Considerable attention in the exercises was given to tactical air operations at night which practiced the mission of delivering mass strikes against "enemy" targets. For example, during Exercise Cold Fire-83 up to 15 percent of the sorties actually were flown at night, which indicates, in the assessment of military specialists, the increased effectiveness of navigation equipment in modern aircraft and the flight personnel's schooling.

The joint NATO naval forces focused primary efforts on working problems of winning sea supremacy, supporting the movement of strategic reserves from the United States to Europe, protecting sea lines of communication and conducting landing operations.

Command and control problems were worked in practically all exercises, with the command element striving to create difficult conditions: intensive "enemy" electronic countermeasures, the disabling of a significant portion of control posts, communications centers and communications channels, and so on. Steps both of an organizational and a technical nature were taken additionally to reinforce secure command and control, above all by extensive use of digital data transmission methods.

While playing through different variants of fighting a war with the staffs and troops, the NATO command attached particular importance to logistical support

of the NATO OVS in Europe. Various troop, command and staff, and special logistical exercises worked problems of logistical and medical support, military movements of various cargoes within the European Theater of War and their delivery from abroad, the supply of units with nuclear ammunition, and the improvement of rear area control. The foreign press noted that the logistical support system which has been formed in NATO is capable of accomplishing missions of supplying forces with various military materials, but there still is a lack of coordination in distributing duties between national logistics services and the NATO OVS logistics entities.

Operational and combat training activities of the NATO OVS conducted in recent years are believed by western specialists to indicate a significant increase in tactical capabilities of the general-purpose forces, which allows the bloc command to gradually increase the length of time combat actions are conducted using only conventional weapons.

An improvement in combat effectiveness of the general-purpose forces was taken into account during all major exercises of the North Atlantic Alliance's troops in 1983, especially in the NATO OVS command and staff exercise Wintex-83. The theoretical provisions and conclusions of this KShU [command and staff exercise] also were tested practically during the fall Autumn Forge-83 maneuvers in which the military-political leadership required the staffs and troops to implement new guidelines of the bloc's coalition military strategy faster. They are orienting the joint armed forces toward being ready for active preemptive actions from forward lines.

And so the nature and direction of operational and combat training of NATO's OVS indicate a desire by the bosses of this aggressive bloc to achieve superiority over countries of the socialist community and to disrupt the military-strategic balance between socialism and imperialism.

"Attainment of this balance," emphasized Comrade Yu. V. Andropov in a speech at the June 1983 CPSU Central Committee Plenum, "is one of the most important results of recent decades. It demanded much effort and means of our nation and the nations of other countries in the socialist community, and we will not permit it to be broken. We will continue to do everything necessary to assure the security of our country and that of our friends and allies, and we will increase the combat might of the Soviet Armed Forces, which represent a powerful factor in deterring the aggressive aspirations of the imperialist reaction."



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## FRG GROUND TROOPS COMPOSITION DESCRIBED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 1, Jan 84 (signed to press 5 Jan 84) pp 27-33

[Article by Lt Col V. Konstantinov: "FRG Ground Forces"; passages rendered in all capital letters printed in boldface in source]

[Text] In supporting the U.S. militaristic course, the FRG's military-political leadership continues to take steps to strengthen NATO, striving to raise its contribution toward increasing the military power of this aggressive bloc's joint armed forces. At the present time the Bundeswehr is the main striking force of the NATO OVS [Joint Armed Forces] in the Central European TVD [theater of military operations].

The Bundeswehr command gives much attention to a further build-up in the striking power, combat might, mobilization readiness and maneuverability of the ground forces, the large units [soyedineniye] of which are earmarked for operational subordination to the NATO command in wartime.

The FRG's ground troops are considered to be the most combat-ready component of the country's ground forces[1] (352,500) and make up more than 78 percent of their total strength. Even in peacetime they are maintained at a high level of combat readiness, are manned at 80-85 percent strength and have 100 percent of their weapons and military equipment.

During 1980-1982 the command element reorganized the ground troops in conformity with a long-range program and a five-year program for development of the armed forces. As a result of their conversion to a new organization and establishment, the total number of divisions remained the same (12), but the number of armored divisions rose from 4 to 6, armored brigades from 12 to 17 and tank battalions from 48 to 67. The divisions have 14 combat battalions each (15 in the mountain infantry division and 12 in the airborne division). The increase in number of combat battalions occurred through the introduction of a composite tank battalion in the armored brigades and of a composite motorized infantry battalion in the motorized infantry brigades. Two infantry battalions were introduced additionally to the divisions (except for the airborne division). They are the division commander's reserve and are intended for conducting combat actions in forests, densely populated areas and on rugged terrain.

Special attention was given during the reorganization to a build-up in the firepower of ground troop units [soyedineniye and chast']. An artillery regiment of 203.2-mm self-propelled howitzers was formed in each corps (two battalions, each with 18 pieces). A surface-to-air missile regiment (36 Roland-2 ZRK's [surface-to-air missile systems]) was set up in the corps and a AAA regiment (36 Gepard ZSU's [self-propelled AAA mounts]) was formed in the division for strengthening air defense. According to the foreign press, questions of increasing the capabilities to combat enemy tanks and other armored targets were of considerable importance during the reorganization. Along with an increase in the number of PTRK's [antitank missile systems] in the divisions, a regiment of antitank helicopters (56 BO-105P with six HOT PTUR's [antitank guided missiles: ATGM's] each) was set up in the corps along with an increase in the number of PTRK's in the divisions.

The troops simultaneously continue to be outfitted with new weaponry and military equipment. The Leopard-2 tank, Jaguar-1 self-propelled launchers with the HOT ATGM and Jaguar-2 self-propelled launchers with the TOW ATGM, the Luchs combat reconnaissance vehicles, and Fuchs APC's are being supplied to the units. The delivery of BO-105P antitank helicopters, the Roland-2 ZRK and the LARS-2 RSZO [multiple launch rocket system: MLRS] (Fig. 1 [figure not reproduced]) is being completed. The PzH-70 155-mm self-propelled howitzers, the PC30 MLRS, a new generation PTRK, ammunition, communications systems and REB [electronic warfare: EW] equipment are planned for delivery to the troops in the near future.

The Inspector (commander in chief) of the ground forces exercises immediate direction of the ground troops through his main staff, which develops the organization and composition, plans for organizational development and operational employment of the ground forces, and combat training programs; determines troop locations; directs the preparation of manuals, regulations and training aids; and plans logistical support.

At the present time there are 12 divisions in the order of battle of the ground troops: three motorized infantry divisions--the 2d, 4th and 11th; six armored divisions--the 1st, 3d, 5th, 7th, 10th and 12th; one mountain infantry division--the 1st (8th); and one airborne division--the 9th; all are contained in three army corps (the 1st, 2d and 3d), and the 6th Motorized Infantry Division is under the immediate control of the Inspector of the Ground Forces and is intended for conducting combat actions as part of a joint Danish-West German corps in Schleswig-Holstein, Jutland and on Fuenen Island.

Judging from the latest foreign press reports, the ground troops have $24^2$ Lance UR [guided missile] launchers, more than 3,000 Leopard-1, Leopard-2 and M48 tanks, some 1,700 field artillery pieces and mortars, up to 2,900 antitank weapons, over 1,700 Roland-2 surface-to-air missile [SAM] systems, the Gepard ZSU and AAA, and more than 650 army aviation helicopters.

The ARMY CORPS--the highest tactical unit [soyedineniye] of the ground troops--in peacetime includes a headquarters, eight commands (artillery, air defense, army aviation, signal, engineer, logistics, and the repair-reconstruction and medical services) and 3-4 divisions of different types.

The army corps COMMANDS. The artillery command includes a headquarters, a Lance missile battalion (six or eight launchers), an artillery regiment (36 203.2-mm self-propelled howitzers), battalions for special weapons supply and for security, and support and maintenance subunits.

The air defense command includes a headquarters, SAM regiment (36 Roland-2 SAM systems, Fig. 2 [figure not reproduced]), two AAA battalions (each with 24 40-mm L-70 antiaircraft guns), aerial surveillance equipment, and support subunits. The army aviation command consists of a headquarters and three regiments: one of antitank helicopters (56 BO-105P's), one of light transport helicopters (48 UH-1D's), and one of medium transport helicopters (32 CH-53G's). It includes in addition a reconnaissance and communications squadron (12 BO-105M's) as well as maintenance and support subunits.

The signal command organizes the operation and maintenance of the AUTOKO communications system, provides communications for corps units and performs EW. Subordinate to it is a headquarters, two signal battalions, a signal intelligence battalion, and maintenance and support subunits.

The engineer command includes a headquarters, engineer battalions, amphibious engineer battalions, pontoon battalions, and support subunits.

The repair and reconstruction command is intended for the repair and reconstruction of corps weapons. It includes a headquarters, a radiotechnical and electronic equipment repair battalion, two repair and reconstruction battalions for weapon and combat equipment repair, and support subunits.

The logistics command has two supply battalions, a reserve battalion and 18 corps depots; and the medical command has two medical battalions, a medical transportation battalion, and field hospitals.

The 1st Army Corps, which in peacetime numbers more than 100,000 persons and in wartime 170,000, is the most powerful in order of battle and weaponry. It includes a headquarters, the 11th Motorized Infantry Division (with headquarters in the city of Oldenburg), three armored divisions (the 1st at Hannover, the 3d at Buxtehude, and the 7th at Unna), as well as three corps level commands. It has a total of eight Lance guided missile launchers, some 1,200 Leopard-1 and Leopard-2 tanks (Fig. 3 [figure not reproduced]), more than 500 field artillery pieces and mortars, 144 Jaguar-1 and Jaguar-2 self-propelled launchers, some 2,000 Marder BMP's [infantry fighting vehicles], Luchs BRM's [combat reconnaissance vehicles] and M113 APC's, 36 Roland-2 SAM systems, 144 Gepard ZSU's (Fig. 4, color insert [figure not reproduced]), and 56 antitank helicopters.

Having considerable striking force and firepower, the corps is intended above all for conducting offensive combat actions on the left flank of the Northern Army Group. As noted in the foreign press, numerous exercises held under the national plans and within the framework of the NATO OVS have practiced conducting both offensive and defensive combat actions by corps units, taking advantage of the favorable physical geography conditions of the North German plain.

In peacetime the 2d Army Corps numbers some 80,000 persons (120,000 in wartime). It has the 4th Motorized Infantry Division (with headquarters in the city of Regensburg), the 10th Armored Division (Sigmaringen), the 1st (8th) Mountain Infantry (Garmisch-Partenkirchen) and the 9th Airborne Division (Bruchsal), as well as corps commands as in the 1st Army Corps. Its order of battle includes six Lance guided missile launchers, more than 800 tanks, some 500 field artillery pieces and mortars, over 1,000 antitank weapons, some 900 Marder BMP's, Luchs BRM's and M113 APC's, 36 Roland-2 SAM systems, 144 Gepard ZSU's and 56 antitank helicopters.

The 3d Army Corps, which in peacetime numbers 70,000 persons (over 100,000 persons in wartime), includes the 2d Motorized Infantry Division (with headquarters in the city of Kassel), the 5th and 12th armored divisions (Diez and Veitshöchheim, respectively), as well as commands of corps subordination. It has a total of six Lance guided missile launchers, more than 850 tanks, over 400 field artillery pieces and mortars, some 690 antitank weapons (including 100 Jaguar-1 and Jaguar-2 self-propelled launchers), up to 1,200 Marder BMP's, Luchs BRM's and M113 APC's, 36 Roland-2 SAM systems, 108 Gepard ZSU's and 56 antitank helicopters.

Being the basic tactical units of the ground troops, the divisions are capable of fighting both as part of the army corps as well as independently.

The MOTORIZED INFANTRY DIVISIONS basically have the identical organization and consist of a headquarters and headquarters company, two motorized infantry brigades, one armored brigade, an artillery regiment (six 203.2-mm self-propelled howitzers, 18 155-mm howitzers on mechanical transport and 16 LARS MLRS's), a AAA regiment (36 Gepard ZSU's), a squadron of army aviation (ten BO-105M helicopters), battalions (reconnaissance battalion, two infantry battalions,[3] engineer battalion, signal battalion, reserve battalions, security battalion, supply battalion, medical battalion, and repair and reconstruction battalion) and companies (signal intelligence company and company for defense against OMP [mass destruction weapons]).

In peacetime each division has a total of some 18,000 persons (over 24,000 in wartime), up to 250 tanks, 78 field artillery pieces (which can fire nuclear ammunition), 16 110-mm LARS MLRS's, 42 120-mm mortars, more than 250 ATGM systems, 36 Gepard ZSU's, and over 400 Marder BMP's, Luchs BRM's and M113 APC's.

The motorized infantry and armored brigades[4] which are part of the ground troops basically are identical in strength, organization and weaponry. Their distinction lies in the ratio of motorized infantry and tank battalions.

The motorized infantry brigade (some 4,000 persons) has a headquarters, motorized infantry battalions (two, each with 27 Milan ATGM systems, 24 Marder BMP's, 15 M113 APC's and six 120-mm mortars), a composite motorized infantry battalion[5] (13 tanks and 24 Marder BMP's), a tank battalion (41 tanks), an artillery battalion (18 155-mm self-propelled howitzers) and the following companies: headquarters and supply, antitank (12 Jaguar-1 self-propelled launchers), engineer, repair, supply, and medical.

The armored brigade (up to 3,500 persons) includes a headquarters, two tank battalions (41 Leopard tanks in each), a composite tank battalion (28 tanks and 11 Marder BMP's), a motorized infantry battalion (35 Marder BMP's), artillery battalion (18 155-mm self-propelled howitzers), and the following companies: headquarters and supply, antitank (12 Jaguar-2 self-propelled launchers), engineer, repair, supply, and medical.

The armored divisions have an identical organizational structure and are the chief striking force of the Bundeswehr ground troops. They are intended for conducting primarily offensive operations in coordination with large units [soyedineniye].

The ARMORED DIVISION includes a headquarters and headquarters company, two armored brigades, one motorized infantry brigade, an artillery regiment (six 203.2-mm self-propelled howitzers and 18 155-mm howitzers on mechanical transport, and 16 LARS MLRS's), a AAA regiment (36 Gepard ZSU's), a squadron of army aviation (ten BO-105M helicopters), as well as battalions and companies (the very same as in the motorized infantry division). The personnel strength in peacetime is over 17,000 (it is some 22,000 in wartime). Armament includes over 300 tanks, 78 field artillery pieces (which can fire nuclear ammunition), 16 LARS MLRS's, 36 120-mm mortars, over 200 ATGM systems, 36 Gepard ZSU's, and around 380 Luchs BRM's, Marder BMP's and M113 APC's.

The MOUNTAIN INFANTRY DIVISION has certain features in order of battle and numerical strength in comparison with the other large units because of its employment. In the assessment of FRG military specialists, thanks to its organization, armament and level of combat training it can conduct successful independent combat actions in the mountains, the forest and on rugged terrain and, in coordination with armored and motorized infantry units, on moderate and level terrain. The division has a headquarters and headquarters company, mountain infantry brigade, armored brigade, motorized infantry brigade, artillery regiment, AAA regiment, separate tank battalion (54 Leopard tanks), a squadron of army aviation, combat and logistical support battalions (a reconnaissance, engineer, signal, supply, and medical battalion, two infantry battalions, reserve battalions, and security battalion) as well as a company for defense against OMP. In peacetime this division has a total of some 19,000 persons (more than 23,000 in wartime). Its armament includes some 250 tanks, 78 field artillery pieces (including 18 105-mm mountain howitzers), 16 LARS MLRS's, 54 120-mm mortars, up to 250 ATGM systems, 17 Jagdpanzer 90-mm antitank guns, 36 Gepard ZSU's, and other weapons and military equipment.

The mountain infantry brigade (some 5,000 persons) has a headquarters, four mountain infantry battalions (each with 21 Milan ATGM systems and six 120-mm self-propelled mortars), an artillery battalion (18 105-mm mountain howitzers) and six companies: headquarters and supply, antitank (17 Jagdpanzer 90-mm self-propelled antitank guns), engineer, defense against OMP, supply, and mountain pack.

The AIRBORNE DIVISION differs in its organizational structure and armament from the other large units of the ground troops. It consists of a headquarters and headquarters company, three airborne brigades and a signal battalion.

In peacetime it has over 8,000 persons (some 11,000 in wartime), 300 Milan and TOW ATGM systems, 48 120-mm mortars and more than 100 20-mm guns.

The airborne brigade (some 3,000 persons) has a headquarters, three parachute battalions (each with 28 Milan and TOW ATGM systems and 12 20-mm guns), one nucleus parachute battalion (16 Milan ATGM systems) and one reserve (nucleus) battalion, as well as five companies: headquarters, mortar (16 120-mm mortars), engineer, supply, and medical.

In wartime the airborne brigades are placed under the operational control of army corps (27th to the 1st, 25th to the 2d and 26th to the 3d army corps) and are employed as an operational airborne assault force in corps interests, for replacing first echelon units and subunits which have suffered considerable losses resulting from nuclear strikes, and for performing reconnaissance and sabotage missions in the enemy rear.

COMBAT EMPLOYMENT. Each year corps troop exercises are conducted to practice combat actions of the corps units and with the involvement of units and subunits of other NATO bloc member countries. A 1st Army Corps troop exercise, Starke Wehr, for example, was held in September 1982 in which ground troops of the United States and the Netherlands took part. As with all previous exercises, it was an opposed-forces exercise, which made it possible to practice defensive and offensive actions. The active phase of the exercise began with the gaming of a move into a counteroffensive. This confirms once more that despite assertions of official propaganda the FRG's ground troops are preparing for offensive combat actions.

The army corps order of battle and reinforcement depend on its role and place in the army group's operational alignment, the missions assigned to it, the situation and nature of enemy actions, and terrain conditions.

In the views of the Bundeswehr command, an army corps operating on the axis of main attack is assigned a zone of advance up to 80 km, and is given immediate and subsequent missions. Judging from exercise experience, the immediate mission may be up to 100 km and the subsequent mission up to 250 km.

The army corps combat formation in an attack usually is formed in two echelons, with 2-3 motorized infantry or armored divisions in the first echelon and one division in the second. The antitank helicopter regiment is the corps commander's mobile antitank reserve and is employed primarily in a decentralized manner. A squadron of 28 helicopters operates in the interests of the division performing a mission on the axis of main attack, or [the regiment] is used at full strength to repulse the counterblows (counterattacks) of enemy tank units. In the latest exercises the corps [plural] included brigades of Heimatschutz troops (the 52d Heimatschutz Brigade in the 1st Army Corps and the 55th in the 2d Army Corps). They operated in the corps first echelon, they were used to combat tactical airborne assault forces in the friendly rear, and they were assigned to the reserve. The foreign press stressed that the Heimatschutz brigades concede nothing in tactical capabilities to motorized infantry brigades of the ground troops.

It is also noted that the inclusion in ground troops of new reconnaissance capabilities (the unmanned CL-289 reconnaissance aircraft, the Argus reconnaissance system, radars and others), weapon systems with a long range of action (the MLRS and the LARS-2), highly effective ATGM's, as well as new ammunition will increase considerably the capabilities of corps units to inflict losses on the enemy at long ranges.

MANNING. The ground troops are made up of personnel conscripted on the basis of a law on universal military obligation (male citizens 18-32 years of age); by persons who have signed a contract to perform duty for from 2 to 15 years; as well as by regular servicemen (primarily the officer corps). At the present time 52 percent of the ground forces consist of first-term servicemen and 48 percent are regular or contract servicemen. The call-up for active duty is held four times a year (around 250,000 persons for a 15 month period). Questions of increasing this term to 18 months now are being examined.

Persons who have served a term of active duty and have not declared a desire to serve on contract are in the reserve of "constant readiness" for the first 12 months after their release. Subsequently they are transferred to the general reserve. It has been reported that the number of trained reservists approaches 2.7 million. While in the reserve the personnel are brought in for retraining and for participating in exercises for a total duration of 9-18 months.

In the assessment of the Bundeswehr command, the manning system meets modern demands for preparing highly qualified cadres for the ground troops.

The training of rank-and-file personnel is accomplished during a three-month period under a uniform program (in training companies and at corps training centers). Then the battalions are brought up to strength on a company basis, and here the special training of rank-and-file personnel is completed.

NCO training is conducted by phases in operational training subunits, combat subunits, and schools of the combat arms. The training lasts 12 months. NCO's on first-term service spend the remaining three months in troop units in positions of squad commander and the equivalent, and then are released. Regular NCO's and contract NCO's (for 4, 8, 12 and 15 years) undergo training at monthlong courses toward the end of the second year of service. They are given performance appraisals after three years. NCO's who have been given positive appraisals and who have expressed a desire to study can continue training at Feldwebel courses, on completion of which they receive the rank of feldwebel and are assigned to the position of platoon commander.

Officer training is accomplished under full and abbreviated programs.

The full program is intended for regular officers and those serving on contract (for a 12-15 year period). It provides for initial (three months) and basic (three months) training according to the program for rank-and-file personnel, and then nine-month officer candidate courses (a training course at the platoon commander level). After passing tests for officer candidate,

persons with a secondary education who have signed a contract for a period of at least 12 years as well as regular officer candidates enter one of the higher Bundeswehr schools in the cities of Hamburg or Munich, where they obtain a general higher education, a civilian specialty and military-theoretical training. The training period is for three years. At the end of the Bundeswehr higher school lieutenants train for 4½ months at the ground troops officer school in the city of Hannover and 4½ months at a combat arms school, where they gain military knowledge at the company commander level. Officer candidates with a secondary special education undergo production practice (up to a year) after a 15-month course, then they are sent for study at engineering faculties of one of the higher Bundeswehr schools.

The training of officers who have concluded a contract for 3-7 years is conducted under the abbreviated program. After a 15-month training course with the troops and at the combat arms school, they are sent for three months to the ground troops officer school in Hannover, where they train at the platoon commander level and are familiarized with principles of control at the company level. Assigned to positions as platoon commanders among the troops, they receive a military rank after three years of duty and serve until the end of the contract term.

The training of field-grade officers is accomplished at the Bundeswehr military academy in Hamburg. Up to 1,200 persons from the FRG's Armed Forces as well as from other NATO member countries train here for a year.

Bundeswehr measures for building up the combat might of the ground troops represent still further proof that militaristic preparations continue to be among the priority tasks of the FRG's military-political leadership and are a component part of the aggressive plans of the NATO bloc to achieve military superiority over countries of the socialist community.

FOOTNOTES

1. The ground forces organizationally consist of ground troops and territorial troops--Ed.

2. There are four Lance guided missile launchers in the separate battalion in Schleswig-Holstein.

3. In all divisions the infantry battalions, reserve battalions and security battalions are nucleus battalions in peacetime.

4. All brigades included in the division as a rule have a strictly serial numbering beginning with the first. In each division the first brigades are motorized infantry brigades, and then armored brigades. For example, in the 3d Armored Division the 7th Brigade is motorized infantry and the 8th and 9th are armored; in the 11th Motorized Infantry Division the 31st and 32d are motorized infantry and the 33d is armored. The 10th and 12th armored divisions are an exception. Units and subunits of division

subordination are given the division number, and those of brigade subordination are given the brigade number with the addition of a zero. The numbers of motorized infantry and tank battalions and of artillery battalions also are strictly serial in each brigade beginning with the first, and they are added to the brigade numbers--Ed.

5. Motorized infantry and composite tank battalions of all brigades are nucleus battalions. Their deployment is planned during exercises or in a period of threat--Ed.



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# FOREIGN TANK MOBILITY, MANEUVERABILITY ASSESSED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 1, Jan 84 (signed to press 5 Jan 84) pp 33-36

[Article by Engr-Col S. Burtsev, doctor of technical sciences]

[Text] According to the views of foreign specialists, a tank's combat effectiveness is determined by three main components: firepower, protection and mobility. The latter has general requirements placed on it such as movement along roads at maximum speed, the capability of crossing obstacles, and intense maneuvering on the battlefield under enemy fire.

Foreign specialists subdivide tank mobility into operational and tactical mobility. The former is taken to mean tank mobility on the march for the purpose of their concentration in a given area for subsequent employment in an operation and is characterized by average speed, range based on fuel, and vehicle weight and size.

Tactical mobility determines a tank's movement on the battlefield and is evaluated according to many factors, including time spent in active combat based on the fuel reserve, pick-up and braking qualities, the capability for sharp and precise maneuvering, speed on the terrain, crosscountry capability and the capability of negotiating various obstacles.

The power-to-weight ratio (ratio of maximum engine power to the tank's weight) is considered the dominant factor affecting mobility parameters. The higher this indicator is, the greater are the capabilities for maneuvering and for movement at significant speeds. Also of importance is the degree of improvement of the transmission and the running gear, especially the suspension, which provides the necessary smoothness of movement over uneven terrain. In addition to all else, the latter is characterized by the so-called dynamic movement of the road wheels permitting uneven places to be crossed without jolts.

Judging from foreign press reports, capitalist countries are giving a rather large amount of attention to tank development, including an increase in their mobility. Extensive programs for improving the level of this tactical feature have been developed and already are being implemented. Intensive R&D is being conducted to develop small, powerful tank engines, improved transmissions,

movement control systems and suspensions providing great smoothness in moving over the terrain.

There are a number of programs for the purpose of assessing the possibilities of reducing battlefield vulnerability of tanks by intensive maneuvering. In the late 1970's the United States, for example, developed a test model of a light tank, the HSTV-L (a vehicle of high survivability). This tank (Fig. 1 [figure not reproduced]) weighed 18 tons and was fitted with a 650 hp gas-turbine engine (GTD) and a rather improved hydromechanical transmission with a continuous steering mechanism. It had a hydropneumatic suspension. With a power-to-weight ratio of some 40 hp/ton, it had increased mobility, including on broken terrain. The foreign press notes that this tank's tests showed that abrupt maneuvering on the battlefield permits a reduction in its vulnerability to the effect of various antitank weapons, but there is a limit to the intensity of maneuvering determined by the psychophysiological abilities of crew members.

Lately military specialists of capitalist countries have been trying to improve the operational and especially the tactical mobility of tanks even more. For example, the new Abrams M1 (United States) and Leopard-2 (FRG) main battle tanks substantially surpass American and West German models made during the 1960's in their mobility. By using 1,500 hp engines, their power-to-weight ratio rose 1.5-2 times. In addition, automatic hydromechanical transmissions with continuous steering mechanisms based on a hydrostatic drive were used. To attain higher speeds on roads and broken terrain, the dynamic movement of road wheels on the new tanks has been increased from 160 to 350-380 mm. This resulted in an increase in speed on the terrain of approximately twofold. With respect to crosscountry capability and the negotiation of obstacles, these indicators were not changed substantially.

There are different viewpoints at the present time on the question of the level of the power-to-weight ratio. Some western specialists believe that it should be 50 hp/ton. In their opinion this will permit tanks to reach hillcrests quickly, where ATGM launchers usually are located, and maneuver intensively on the battlefield. Others believe that 20 hp/ton is a sufficient level. Judging from foreign press materials, however, this indicator will not exceed 30 hp/ton in accorance with requirements placed on future tanks. Such a high power-to-weight ratio already has been reached presently by using small gas-turbine and diesel four-stroke engines.

There also are different viewpoints concerning the type of tank engine, with two versions presently being examined: the gas-turbine and four-stroke diesel engine. In the opinion of foreign specialists, the former has the following advantages over the latter: a broader range of fuels, the possibility of placing a full load on the engine immediately after starting, relatively low oil consumption, rapid start in low temperatures, an automatic change in torque within broader limits, low maintenance time, smoother operation and the absence of vibration. American experts also take note of its compactness, greater reliability and lesser operating cost, which served as the basis for choosing the engine for the M1 Abrams tank (Fig. 2 [figure not reproduced]).

At the same time a number of deficiencies of the GTD is noted, particularly the high fuel consumption, particularly at small loads and when idling, a considerable air consumption requiring large air cleaners with a high degree of cleaning, low mechanical KPD [efficiency], difficulties in supplying air to the engine when negotiating water obstacles, insufficient dynamic characteristics, and the complexity of the output shaft rpm control system. For this reason certain foreign specialists believe that the diesel engine suits the tank best; it consumes less fuel and is most adapted to variable loads typical of a tank. With the future shift to a design providing for a greater amount of the heat formed coming out with the exhaust gases (the so-called adiabatic diesel), it will be even more economical than the existing diesel and will be smaller than the GTD.

Judging from completed designs, all capitalist countries have a common opinion. The transmission must include a hydromechanical gear box (with interlocking hydraulic torque converter) with automatic shifting and continuous steering mechanism based on a positive-displacement hydraulic drive. Use of a hydraulic torque converter with the capability of automatically changing tank speed and tractive force on the tracks in the same gear within broader limits (than the engine) allows reducing the number of gears in the gear box, making their automatic shifting simpler, reducing the number of controls for straight-line movement and thus making it easier to control the tank. In addition, inclusion of the hydraulic torque converter in the arrangement reduces loads on transmission parts and components, assuring its greater reliability.

The foreign press notes that the primary deficiency of the hydromechanical transmission is the hydraulic torque converter's relatively low efficiency, leading to additional heat release and a lesser range in comparison with the mechanical transmission. It is necessary to install an additional radiator for the hydraulic torque converter's pressure fluid to dissipate this heat and, to increase efficiency, the hydraulic torque converter customarily is used only for starting out, moving under difficult conditions, and shifting gears. The hydraulic torque converter is locked (disengaged) in the other regimes in contemporary foreign hydromechanical transmissions.

Other deficiencies of this type of transmission are considered to be the design complexity, high cost, and increased size and weight. Despite this, their use makes it possible to substantially alleviate tank control, i.e., reduce the driver's work stress, leave him more time to observe the battlefield, simplify training and reduce the time needed for his training.

Particular attention is being given to driving control systems. Gear shifting is automated but in low gears it is possible to control manually, such as when negotiating obstacles. The mechanoelectrohydraulic transmission control system used in the M1 Abrams, Leopard-2 and Chieftain tanks is considered to be most effective.

Continuous steering mechanisms with the positive-displacement hydraulic drive permit changing the curvature of turn rather smoothly (a certain curvature of the movement path corresponds to each position of the wheel or lever). Another advantage of this method is the possibility for confident control of the vehicle when driving at high speeds as well as on slippery roads.

Good braking qualities are provided with the help of powerful disc brakes operating in oil, and special supplementary hydraulic deceleration brakes.

Considered as promising are the hydromechanical transmissions with positive-displacement hydraulic drives being used not only for controlling the turning radius, but also for a smooth change in speed of straight-line movement, which permits more rational use of engine power, the automation and simplification of control, greater average speed and less fuel consumption.

The transmissions of new tanks are made according to a common schematic diagram and differ from each other only in design execution. They usually are configured in a common unit with the engine, which substantially facilitates field repair. The power unit also includes systems for lubricating and cooling the engine and transmission, and sometimes the air cleaners as well (Fig. 3 [figure not reproduced]). Shafts, fuel lines, electrical wiring and mounting points are disconnected when it is disassembled.

In the opinion of foreign specialists, the capability of tanks to use the high power-to-weight ratio depends considerably on their running gear, including the suspension. An improvement in tank suspension designs is following the line of providing for smoothness of vehicle movement and obtaining the highest possible speed on roads and broken terrain based on traction qualities. An attempt is being made to improve the quality of the cushioning by increasing the dynamic movement of road wheels.

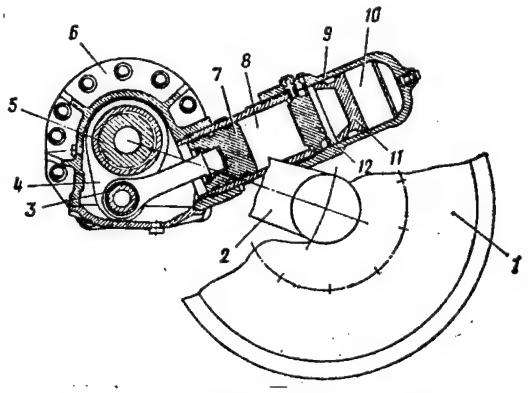


Fig. 4. Schematic diagram of an element of the hydropneumatic suspension of the Challenger tank:

1. Road wheel
2. Support arm
3. Piston rod
4. Lever
5. Support arm spindle
6. Support arm mount
7. Piston
8. Oil
9. Cylinder
10. Gas
11. Spacer piston
12. Partition with openings and valves

The majority of foreign tanks presently have an individual torsion suspension, the advantage of which lies in simplicity of design, servicing and repair, rather high reliability, low vulnerability in combat and relatively low cost. Suitable characteristics can be obtained in combination with hydraulic shock absorbers. The modernized American M60A3 tank uses a tubular strut suspension allowing a more dynamic movement of the wheels. The hydropneumatic suspension is considered more promising, however: taking up less space and weight, it most fully satisfies the demands being placed on the tank suspension. Its basic advantages consist of the possibility of realizing elastic characteristics directly in movement. The chief deficiencies of existing suspensions of this type are the still poor reliability and high cost. Despite this, work continues abroad to develop more improved hydropneumatic suspensions. For example, Great Britain has developed such a suspension for the Challenger tank (Fig. 4). A gas plays the role of the elastic element in it, while a fluid (oil)

compresses it. Flowing through openings and valves, the fluid provides a damping effect.

With respect to improving tank mobility no small importance is attached to an improvement in the track drive, primarily an increase in its longevity. This led to the use of tracks with rubber and metal articulation. Such a design has a higher resistance to wear, smoothness of operation and less power losses.

In addition, foreign specialists are working on design solutions of the following problems: an improvement in tank pick-up (the capability of gaining speed and cutting it quickly), an increase in range (basically by improving engine economy and increasing the amount of fuel carried), an improvement in crosscountry capability and support for the assault crossing of water obstacles. In the opinion of western experts a test model of a Swedish articulated tank is of certain interest. Tests have shown that it has rather good crosscountry capability, especially on adverse terrain. On the whole, as the foreign press reports, all these measures are aimed at improving mobility, a very important tactical feature of tanks which contributes to a significant reduction in their vulnerability on the battlefield.



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## METHODS FOR IMPROVING ANTITANK WEAPONS DISCUSSED

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[Article by Engr-Lt Col V. Petrov, candidate of technical sciences; passages rendered in all capital letters printed in boldface in source]

[Text] NATO's military leaders continue to build up the combat might of ground forces. Improving the capabilities of units to combat tanks and other armored targets is considered to be an important and urgent task. To accomplish it successfully, ground troops of bloc member nations even today are being saturated with a significant amount of varied ground and airborne antitank weapons. For example, the U.S. mechanized division has 162 Dragon light antitank missile systems (PTRK's), 108 TOW heavy PTRK's, 92 M72A2 handheld antitank rocket launchers (RPG's), and 42 fire support helicopters equipped with TOW missiles. In addition to the special antitank weapons, the division has a large number of models of armored equipment and various artillery weapon systems as well as engineer weapons capable of hitting armored targets in various kinds of modern combat.

At the present time ground weapons are the weapons in largest quantity for combating tanks in the armies of NATO countries. They play a primary role in organizing the units' antitank defense and accomplish the largest number of missions for destruction of armored targets. Judging from foreign press reports, these weapons are constantly being improved.

The primary types of ground weapons intended for countering armored targets are antitank missile systems, field artillery with special antitank ammunition, handheld antitank rocket launchers, and engineer munitions. Foreign experts believe that the presence of these weapons as well as of a significant number of tanks, which continue to be a powerful antitank weapon, allows the organization of an echeloned antitank defense during combat actions, in which fire pressure on advancing enemy tanks increases as they approach the forward edge.

ANTITANK MISSILE SYSTEMS, in the opinion of foreign military specialists, are most effective for combating various armored targets. Their primary advantages are a large range of fire (up to 4 km), a rather high target kill

probability (up to 0.8-0.9) in practically the entire operating range, considerable armor penetration (600-700 mm), as well as small size and weight.

The bulk of antitank missile systems in the armies of capitalist states consists of second generation PTRK's--the American TOW and Dragon and the French-West German HOT and Milan. In contrast to obsolete first generation models, they use a semiautomatic system for controlling the missile's flight (the operator tracks only the target with the help of an optical sight). A deviation of the antitank guided missile [ATGM] from the line of sight is detected by the guidance system, which then automatically produces commands for correcting its flight.

Existing second generation systems make use of a semiautomatic guidance system with infrared tracking gear and wire transmission of commands. Two solid fuel rocket motors--booster and sustainer--usually are mounted in the ATGM's. The primary warheads (BCh) are hollow-charge with high armor penetration. HE-fragmentation warheads also have been developed against personnel (the TOW, HOT and KAM-9 ATGM's). The PTRK design has been carried out in three versions: portable (the light Dragon and Milan systems), dismountable-transportable (the TOW and KAM-9), and self-propelled (TOW, HOT and Milan). The latter are carried on tracked and wheeled chassis of modern fighting vehicles (light tanks, BMP's [infantry fighting vehicles] and APC's), by which they have high battlefield mobility.

In the late 1970's the United States developed the M901 self-propelled launcher which fires TOW missiles. Two rails, the sight and infrared tracking gear are mounted on an extensible armored platform. This design permits firing from behind various kinds of cover and folds in the terrain and as a result the launcher's battlefield survivability is enhanced. More than half of the planned 2,000 vehicles already have been delivered to American ground forces.

Leading NATO countries have begun vigorous work to modernize existing PTRK's and to develop new ones with higher performance characteristics. According to statements by foreign specialists, the thrust of development work is to increase the accuracy and firing range of the ATGM's, the penetrative performance of their warheads, and the systems' battlefield survivability.

In the 1970's specialists of the Hughes Aircraft firm took a number of steps to improve the TOW missile. In particular, they increased the range of fire (from 3,000 to 3,750 m) and developed a new, more effective warhead which can be installed on existing missiles without changing their design. Because of a special probe which is extended after launch, the warhead detonates at a distance of 38 cm from the armored obstacle. As a result the hollow-charge jet has time to form and assume the optimum shape, which in turn improves armor penetration. The TOW-2 model of the ATGM (Fig. 1) appeared during further development. It has a warhead 152 mm in diameter (instead of 127 mm) and a motor with enhanced performance. The guidance system also was modified. According to foreign press reports, $145 million was requested for fiscal year 1983 for buying 12,000 TOW-2 missiles, and more than $58 million for installing the new warhead and making improvements to the existing TOW missiles.

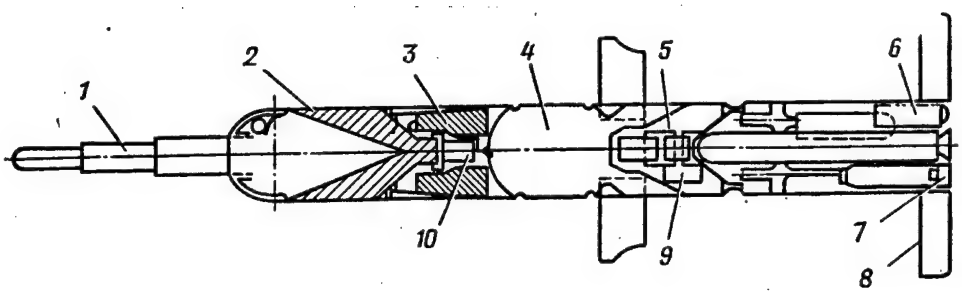


Fig. 1. Diagram of TOW-2 missile

1. Extendable probe
2. Shaped charge warhead
3. Electronics unit
4. Sustainer motor
5. Gyroscope
6. Xenon emitter
7. Infrared emitter
8. Stabilizer
9. Battery
10. Fuze

The American firm of McDonnell Douglas developed two modernized versions of the Dragon missile in the inventory on an initiative basis. One of them has an increased maximum range of fire (from 1 to 1.5 km) through use of a new sustainer motor, and the other is fitted with a powerful tandem warhead.

Modernization of the West European HOT and Milan missiles is following similar lines. Judging from foreign press reports, primary attention during this work is being given to an improvement in the missiles' armor penetration by making design improvements to the warhead, and to an increase in the ATGM's flight speed and range by installing more powerful flight motors.

In the process of being improved the second generation PTRK's are being fitted with thermal-imaging sights permitting firing under nighttime conditions. For example, the AN/TAS-4 and AN/TAS-5 sights have been developed for the American TOW and Dragon systems respectively. Specialists of the FRG, Great Britain and France jointly developed the Mira-2 thermal-imaging sight which is mounted on top of the organic Milan antitank missile system sight (Fig. 2 [figure not reproduced]). It has been reported that an operator has used it to detect a tank at night at a range up to 3 km. The question of using this sight on the HOT antitank missile system is being studied presently.

The basic efforts of foreign specialists in developing antitank missile systems of the subsequent (third) generation are aimed at improving firing accuracy, chiefly by fitting the missiles with automatic guidance systems using the "fire and forget" principle. In firing such missiles the operator performs only the initial aiming (lock-on of the target) and subsequently takes no part in guiding the ATGM.

Fitting ATGM's with homing heads (GSN's) with a mosaic receiver of infrared emissions placed in the focal plane of the optical system is considered to be a promising direction. The Tank Breaker, the missile of an experimental model of an American portable antitank missile system intended for replacing the light Dragon system in the inventory, has such a head in particular. In the

opinion of Rockwell International representatives, the firm which developed this GSN, the head provides rather high effectiveness when firing both against ground and air targets. Target lock-on is accomplished by the head before the ATGM is launched (during aiming). Then in the course of the missile's flight the GSN performs automatic target tracking and guides the ATGM to the target. The head's receiver includes elements of antimony arsenide, which are most sensitive in the 3.4-4.0 micron range. According to the requirements, the maximum range of fire of the Tank Breaker antitank missile system will be 2,000 m, and the minimum range will be 50 m.

The American firms of Hughes and ITT are jointly developing a self-propelled antitank guided missile system ordered by the U.S. Army in which communications and data transmission between the launcher and missile are accomplished over a fiber-optic cable (Fig. 3 [figure not reproduced]). ATGM's in this system will be guided to the target along a plunging trajectory and will hit it from above. An operator accomplishes the guidance by visually observing an image on the screen of the terrain ahead of the missile in flight, transmitted over the fiber-optic cable. The transmission of missile flight control commands also is accomplished over the cable until the selected target is hit.

These firms already have demonstrated the fiber-optic cable of great length (with a diameter of 300 microns and a breaking stress of 1,400 km/cm$^2$) for use in the new self-propelled antitank missile system.

Judging from foreign press reports, American specialists are developing new antitank weapons in addition to the antitank missile systems. In particular, the firm of Vought is developing the first hypersonic missile for combating tanks and other armored targets. In contrast to existing antitank missile systems with a hollow-charge warhead, it will destroy targets with an armor piercing core. It is noted that the necessary armor penetration is achieved thanks to the missile's high flight speed (on the order of 1,500 m/sec) produced by installing a solid fuel rocket motor operating on new, highly efficient fuel. The maximum range of fire is 5 km. Two versions of the missile are being produced: guided and free-flight. The first version uses a laser command guidance system. It is assumed that the launches of guided missiles will be accomplished from aircraft, helicopters and self-propelled ground launchers, and of free-flight missiles from recoilless-gun type ground launchers.

Testing of the ADATS (Air Defense Antitank System, Fig. 4 [figure not reproduced]) self-propelled multipurpose missile system developed jointly by the firms of Martin Marietta (USA) and Oerlikon (Switzerland) began in 1981 at the American White Sands range. According to foreign press reports, it is intended to destroy low-flying air targets (at ranges up to 8 km) and armored ground targets (up to 6 km). The missile (2 m long and 152 mm in diameter), guided along a laser beam, is fitted with a shaped-charge/fragmentation warhead. The unit of fire is eight missiles. There is also a radar for detecting air and ground targets at distances up to 20 and 6 km respectively. In case the system is made operational it is planned for delivery to the troops beginning in the mid-1980's.

The work of developing third generation antitank missile systems also is being conducted in European countries. For example, in early 1983 the ministers of defense of the FRG, Great Britain and France signed a memorandum envisaging the development of two types of systems: with a 2 km range of fire (portable version) and a range of 4-5 km (installed on mobile ground equipment or a helicopter). It is planned to use the first to replace the Milan missile system, and the second to replace the HOT, TOW and Swingfire. Missiles of these systems will be fitted with homing heads and it is planned to have thermal imaging sights for nighttime operations.

In recent years NATO countries have been conducting intensive work aimed at enhancing the capabilities of TUBE ARTILLERY AND MULTIPLE LAUNCH MISSILE SYSTEMS for the effective destruction of armored targets. The United States adopted the 203.2-mm M573 artillery neutron shell (with a TNT equivalent of 1 KT) for this purpose. Foreign experts believe that one such munition has the equivalent effect against tanks of 600-800 tons of conventional shells. At the present time development of the 155-mm XM785 neutron shell is nearing completion.

Much attention is being given abroad to the problem of combating tanks using field artillery pieces firing from indirect positions. This mission is accomplished most effectively through the development of special artillery antitank ammunition with terminal guidance. In 1980 the first Copperhead M712 155-mm guided projectile (with a range of fire up to 16 km) having a semiactive laser homing head became operational in the American ground forces. It was planned to include two such projectiles each in the units of fire of organic M109A2 and M109A3 self-propelled howitzers. Although testing of this projectile in the late 1970's demonstrated a rather high target kill probability, this indicator subsequently turned out to be lower than required. The need for illuminating the target with a laser beam when the projectile is on the final leg is noted as a deficiency. In the opinion of foreign specialists, this is difficult to achieve in an actual combat situation. This circumstance as well as technological defects identified in the projectile design led to a decision made in 1982 to cease its production after the manufacture of 8,000 instead of the previously planned 40,000. Later, after this projectile was modified, the U.S. Army still put in an order for the production of 30,000 units.

It is planned to remedy the above deficiency of the semiactive guidance system in the artillery projectiles being developed in the United States with homing systems requiring no special target illumination. An example is the 203.2-mm SADARM XM836 antitank cluster projectile fired from organic artillery pieces. It has three submunitions, each of which is fitted with a passive millimeter-band (35 GHz) system for detecting targets. These submunitions are ejected from the shell casing in the vicinity of targets and descend on parachutes at a speed of some 9 m/sec. A radiometric system scans the landing area (a diameter of around 300 m) in a spiral as a result of the submunition's rotation (its canister's longitudinal axis is at an angle of 30° to the direction of descent). When a target is detected in the landing area the warhead is triggered, striking the tank from above with a shaped-charge percussion core. The XM836 projectile is expected to become operational in the latter half of the 1980's.

American specialists presently are working to develop even more effective guided artillery projectiles of the 1990's, especially the future 203.2-mm artillery projectile with a range of fire up to 70 km (under the AIFS--Advanced Indirect Fire System--program). Its terminal guidance will be accomplished with either a millimeter-band homing head or a head operating in the infrared band.

A lesser scale of activities to develop guided artillery munitions is typical of the leading European capitalist states in comparison with the United States. In the FRG the first guided mortar round, the 120-mm Bussard, fitted with a shaped-charge warhead, is being developed under direction of the firm of Diehl. Three homing heads are being developed for it: semiactive laser, passive infrared, and active radar.

Work also is going on abroad to increase the effectiveness of multiple launch rocket systems to combat armored targets. Greatest attention is being given to the new American MLRS (Fig. 5 [figure not reproduced]), which is planned to be adopted by armies in a number of NATO countries. It is intended to deliver strikes against area targets, including tank concentrations. It may use 240-mm NUR [free-flight rockets] with cluster warheads loaded with several dozen AT-2 antitank mines of West German development, or the M42 shaped-charge-fragmentation elements (with 644 in each rocket), which hit armored targets from above. According to foreign specialists, when NUR with the M42 elements are fired in a single volley (12 rockets), this provides for the destruction of targets in an area of around 30,000 $m^2$ or one artillery battery is knocked out. A warhead now is being developed with shaped-charge fragments fitted with infrared terminal homing heads.

ANTITANK ROCKET LAUNCHERS (RPG) are viewed as an important close-combat antitank weapon by the army commands of capitalist countries. A rather large amount of attention has been given to their development, especially of late. This explains the significant number of development projects abroad for new rocket launchers intended to replace organic models in the near future.

Experimental RPG's differ from the existing ones chiefly by increased accuracy and range of fire as well as by their armor penetration. Basic firing characteristics have been improved primarily by installing new, more powerful solid-fuel rocket motors on the rockets which allow them to rapidly accelerate to high speeds. For example, the rocket motor of the new American Viper RPG uses a fuel (with a carborane additive) with a high burning rate.

A substantial increase in armor penetration (up to 500 mm or more) has been achieved by using a large-caliber warhead. New types of warheads are being developed to increase the lethality of the munitions. For example, a tandem warhead has been developed with two charges, a shaped-charge and fragmentation-HE charge, located in succession on the same axis (Fig. 6 [figure not reproduced]). The first charge permits the obstacle to be pierced and the second charge (which detonates with a certain delay) penetrates within the fighting vehicle or emplacement and injures personnel with fragments and the shock wave.

It is planned to continue to use various kinds of antitank mines to combat armored targets in modern warfare. At the present time the primary NATO countries are giving more and more attention to remote mining systems which allow inflicting heavy losses on tanks and other equipment and constraining troop actions. The United States has developed the M718 and M741 155-mm cluster projectiles, each containing nine belly attack mines (each weighing 2.2 kg) triggered by a magnetic fuze. According to foreign press reports, a six-gun battery can lay an antitank minefield 300 x 250 m in size with two volleys of such projectiles.

Especially extensive use of the MLRS is planned for remote laying of antitank minefields. NUR with cluster warheads loaded with antitank mines are being introduced to their units of fire for this purpose.

Plans abroad for building up unit capabilities for combating tanks set aside a significant role for ARMY AVIATION HELICOPTERS and fire support helicopters above all, which now are in the inventory of armies of all the primary NATO countries. In the assessment of American military specialists, 200 AH-1S antitank helicopters (each with eight TOW ATGM's) are capable of knocking out some 900 tanks in one sortie.

Fire support helicopters of the next generation will be even more effective: the Apache AH-64A (USA, Fig. 7 [figure not reproduced]), the PAH-2 (FRG, France) and the A 129 Mangusta (Italy). They will differ from existing models by better flight performance, the presence of modern electronics, and considerably more powerful antitank weapons. For example, the Apache AH-64A will be able to carry 16 third generation Hellfire ATGM's (with a range of fire up to 6,000 m) with semiactive laser homing head.

Based on the experience of local wars and exercises which have been held, TACTICAL AIRCRAFT are a rather effective means for combating armored equipment. The most advanced aircraft are the A-10A (USA) and Alpha Jet (FRG, France) ground attack aircraft equipped with air-to-ground guided missiles, 30-mm rapid-fire guns, and clusters of small-caliber shaped-charge bombs.

This antitank weaponry of tactical aviation is constantly being improved. For example, the United States is developing the SUU-65 cluster and the Wasp guided missile under the WAAM program. The cluster (weighing 454 kg) can be loaded with the BLU-99 ACM antitank ammunition, the warhead of which functions by the principle of a percussion core; with bombs having a combination effect; or with the BLU-101 and BLU-102 ERAM antitank mines which home with the help of infrared sensors. The Wasp missile (weighing 36 kg) will be one of the most effective antitank weapons, in the assessment of American specialists, thanks to the use of a millimeter-band homing head (35-39 or 99 GHz), which searches for and locks on a target and then guides the missile to it (the missile can hit tanks at a range up to 12 km). Similar airborne antitank guided weapons are being developed in the FRG, Great Britain, France and Israel.

The United States has been developing the first comprehensive antitank system, Assault Breaker, since the late 1970's. It is intended to associate into a single whole the means for detecting armored equipment and the means of

destruction in order to assure effective combat against tanks at significant distances from the forward edge (up to 150-200 km). The primary elements of this reconnaissance-attack system will be:

--An airborne system for detection of targets and guidance of missiles, including a side-looking airborne radar with a synthetic aperture;

--Means for destroying tanks, including the T-22 and T-16 missiles. The former (with a range of fire up to 150 km) is being developed on the basis of the Lance surface-to-surface guided missile, and the latter on the basis of the Patriot ZUR [surface-to-air missile] (the horizontal launch range will be around 200 km; it is planned to be accommodated aboard B-52, C-130 or F-16 aircraft). The nose cones of both missiles will be loaded with a large number of antitank submunitions with homing heads;

--Automated communications and control equipment.

It is planned to use Assault Breaker as a corps asset. Lately the FRG, Great Britain and France have been showing great interest in its development.

In the opinion of foreign specialists, tanks themselves will play an important role in fighting tanks. Their development also is proceeding along the line of a substantial enhancement of their firepower through an improvement of the main gun and ammunition, and thanks to the adoption of modern fire control systems.

And so at the present time the army command elements of the primary NATO countries have a set of sufficiently advanced antitank weapons and systems capable of destroying armored targets both in the immediate vicinity of the forward edge and at a significant distance from it. Research and development being performed abroad across a broad front is aimed at achieving a further growth in the combat effectiveness of these weapons. In the opinion of western specialists, this should considerably enhance the capabilities of subunits and units for destroying armored equipment under various conditions of modern warfare.



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## MODERN FIGHTER IN AERIAL COMBAT

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[Part One of article by Col V. Kirillov, candidate of military sciences; passages rendered in all capital letters printed in boldface in source]

[Text] Military leaders of the United States and other countries which are members of the NATO imperialist bloc set aside an important role for military aviation in accomplishing their aggressive plans and assign it a number of combat missions including the winning of air superiority, believing it to be a necessary condition for successful combat actions by all branches of the armed forces. The destruction of enemy aircraft in the air is considered one of the chief methods of accomplishing this mission. In this connection the air forces of the United States and its allies have been devoting much attention in recent years to the improvement of fighters and development of their operating tactics in aerial combat.

Five years ago the journal published an article by the same title as this article* which gave a formula developed by foreign specialists for an aircraft's capability to conduct aerial combat. It reflected the degree of influence of various factors (chiefly the capabilities of aviation equipment) on the formation of operating tactics and attainment of success in combat, and had the following appearance:

$$L \approx \frac{\left(\frac{P}{G}\right) \cdot SEP \cdot T \cdot M \cdot Bd \cdot Sl \cdot N \cdot Wa^3 \cdot B^4}{\left(\frac{G}{S}\right)^2 \cdot Cr},$$

*See ZARUBEZHNOYE VOYENNOYE OBOZRENIYE, No 2, 1979, pp 53-60, and No 3, 1979, pp 43-49--Ed.

where L -- aircraft capability to conduct aerial combat;
P -- engine propulsion;
G -- flying weight;
SEP -- surplus energy or specific surplus power;
T -- deceleration (braking);
M -- effect of high-lift devices;
Bd -- aircraft controllability;
Si -- aircraft stability;
N -- individual protection (invulnerability);
Wa -- capabilities of warning gear;
B -- weapon performance;
S -- wing surface;
Cr -- aircraft dimensions;
$\frac{P}{G}$ -- aircraft thrust-to-weight ratio;
$\frac{G}{S}$ -- unit wing load.

In order of importance the main factors were distributed as follows: weapons, timeliness of detecting the enemy (it was represented only by an indicator of equipment capabilities; the western military press often calls it the electronics factor), maneuverability, invulnerability and others. The formula was backed up by performance characteristics and indicators achieved in testing third generation jet fighters which became operational in air forces of the capitalist countries. As of the present time some of these aircraft have undergone a check during exercises and real aerial combat in various local aggressive wars unleashed by imperialism. In particular, the American F-15 and F-16 fighters which the United States generously supplied to the military aviation of the Israeli zionists took an active part in aggressive operations in the Near East. As a result foreign specialists had an opportunity to assess the correctness of the formula which had come into the world without as yet practical proof.

In covering the opinions of its experts on this matter, the western press views the aforementioned factors in the following sequence: electronics, weapons, maneuverability and invulnerability.

The ELECTRONICS FACTOR (Wa), the primary component of which is considered the range of the enemy's radar detection, was placed first inasmuch as it predetermines success of the first phase of combat--search and detection of the enemy. The West German journal FLUG REVUE wrote on this score: "The capability of detecting and identifying a target exerts a direct effect on the development of combat, especially in its initial phase. If these operations were performed by a friendly aircraft earlier than the enemy, then the time reserve which has appeared can be used for a 'dash'--a rapid increase in speed necessary for closing or for gaining the altitude which provides a certain tactical advantage."

As jet fighters developed and their flight speed and missile launch range increased, a trend appeared toward an expansion of the space in which aerial combat is conducted. For example, with the AIM-7F Sparrow guided missile aboard a third generation fighter the closing with the enemy must begin at a

distance of around 100 km. Therefore the pilot of this aircraft must receive information about the enemy at approximately the 200 km line in order to have time to perform all operations of lock-on and aiming. In addition, the area of combat operations itself may be at a great distance from ground radar posts. On the whole, this exceeded the limits of capabilities of ground radar posts for detecting air targets and vectoring friendly fighters to them. The foreign press notes that this situation was typical of the air war in Southeast Asia waged by the United States and was repeated in the last armed conflict in the Near East, during Israel's aggression against Lebanon. The question arose about extending the radar field into the depth of enemy territory in order to detect air targets at a line allowing the timely commitment of fighters.

In Vietnam the U.S. Air Force partially solved the problem of expanding the control zone by using the EC-121 and E-2A Hawkeye long-range early warning and control aircraft, which usually were on duty in the air for the entire period of a raid against DRV [Democratic Republic of Vietnam] targets by American aircraft. They would perform surveillance of the air space over the area of combat actions using airborne radars and would warn friendly pilots about the appearance of enemy fighters.

Taking this experience into account, Israel's military leadership purchased four E-2C Hawkeye aircraft (Fig. 1 [figure not reproduced]) in the United States. In comparison with the first modifications (A and B), the E-2C's capabilities for detecting air targets increased considerably. Its AN/APS-125 airborne radar (with an antenna diameter of 7.32 m) would detect bombers flying at an altitude of 9,000 m at a range of 740 km, and at a distance of 460 km at low altitude. An enemy fighter could be detected against the background of the earth's surface with its help at a range of some 400 km (the flying altitude of the E-2C is 9,000 m).

According to data of the American journal AVIATION WEEK AND SPACE TECHNOLOGY, the Hawkeye aircraft was used for the first time as an airborne command post (VKP) in aerial combat against enemy fighters over Lebanon in June 1979. In the first phase of combat it performed reconnaissance of the air space to a great depth using the radar and performed direction-finding of aircraft by intercepting radio conversations of their crews. In addition, data would be radioed to the airborne command post from visual observation posts on the ground.

Air targets were identified by means of the "identification friend or foe" [IFF] electronic system. As the western press noted, however, its gear would "become confused" in a complicated situation where the limited air space was saturated with a large number of maneuvering aircraft, and it "traditionally" was not distinguished by reliability. American pilots became convinced of this back during Vietnam when they shot down two of their own Phantoms, after which it was prohibited to make an attack decision based on the data of the IFF system, and mandatory visual identification of a target based on external characteristics was introduced. To this end it was necessary to close with the enemy to a distance permitting basic details (the configuration) of the

aircraft to be picked out by the naked eye, which presented danger to the attacking fighter.

The deficiencies of identification systems became chronic and were passed on to the following generation of fighters. The British journal FLIGHT wrote on this score: "Capabilities of the new air-to-air guided missiles and the airborne platforms for these missiles aggravated the problem of identifying aircraft at long ranges. In many countries fighters are armed with guided missiles having a launch range greater than 35 km. Before launching a missile to such a range the pilot must be sure he is attacking the enemy, but it has become dangerous to close until visual recognition is made. Unfortunately the modern IFF equipment does not yet provide an unambiguous determination of the subordination of the aircraft."

Air forces of the United States and other member countries of the aggressive NATO bloc took certain steps to solve this problem. In particular, the American firm of Northrop developed a test model of a television sight with which it is possible to identify a flying aircraft at a distance of 16-19 km based on external characteristics. A gyro-stabilized system with an optical telescopic sight provided for lock-on and tracking of an air target in this test model. The detected target was displayed on a small television screen. The sight was coupled with the weapon control radar, which permits the pilot to perform general orientation on the screen and quickly shift to observation through the telescopic sight.

This sight was tested in the new deck-based F-14 fighter in experimental conditional aerial combat against an old generation F-5 fighter. AIM-7F Sparrow practice missiles were suspended on the F-14 and AIM-9L Sidewinder missiles were on the F-5. When the AIM-7F missiles were "launched" on a head-on course from a range of 14-16 km the F-14 still was outside the impact zone of the Sidewinder missiles, but in the process of tracking the "enemy" with the airborne radar for "illuminating" the target (until the moment its missile impacted with the target) the F-14 entered this zone. The chances for success in combat for the aircraft of the two generations were practically equal because of the unresolved problem of identification at long range.

The British Air Force presently is practicing a visual identification technique. A pair of aircraft form up on line with an interval of 1.6-4.8 km to expand the air space field of view. After detecting an unidentified target the pair turns toward it and attempts to "bracket" it. The leader makes a demonstrative maneuver: he moves forward, dashes past the target on a head-on course with small lateral deviation and identifies the target visually. If the enemy decided to engage in aerial combat, his most likely reaction would be a vigorous turn toward the leader. Then the wingman is in a favorable position to attack the target from the rear hemisphere. This method was tested by British pilots during the Anglo-Argentine armed conflict over the Falkland (Malvinas) Islands.

NATO specialists consider one of the methods for identifying enemy aircraft in the air to be continuous tracking of them beginning with the take-off or from

the moment they are detected in that part of the air space where no friendly aircraft were at this time. In other words, the missions of long-range radar detection and identification must be combined.

According to reports of the American journal AVIATION WEEK AND SPACE TECHNOLOGY, Israeli Air Force use of the Hawkeye AWACS aircraft in combat actions in the Near East permitted the detection of Syrian fighters in a number of instances immediately after take-off. But the tracking of them might be broken off after they entered the "blind zone," i.e., that part of the air space not under surveillance by the E-2C's airborne radar because of the influence of the terrain's mountainous relief. In this case F-15 fighters (Fig. 2 [figure not reproduced]) would be sent forward to cover this zone with their own AN/APG-63 radars (they can detect air targets against the earth's surface at a distance up to 50 km). By resorting to this technique the Israeli Air Force attempted to fulfill the requirement of creating a continuous radar field over the area of combat actions throughout the range of altitudes and accomplish constant surveillance of the aircraft in it from the very beginning to the end of combat.

At the same time, as the foreign press notes, the difficulties which arose in using the recognition system when the air situation became more complicated did not permit giving up the requirement of visually determining the target's subordination based on external characteristics. In the final account this led to limitations in the use of medium-range weapons by the fighters.

As western military experts believe, the electronics factor had a direct effect on the second phase of aerial combat--the approach. Success in the approach continued to be provided by two tactical elements--concealment and swiftness. The former was achieved by concealing the aircraft against enemy radar observation by producing active jamming. This would be done from the airborne duty zones of EW aircraft, from mobile ground stations, and from aboard warplanes equipped with the corresponding gear. As the journal INTERNATIONAL DEFENSE REVIEW wrote, active radio countermeasures was carried out by creating spot, barrage and imitative jamming.

Foreign military specialists note that for performing spot jamming it is necessary to know in advance the precise frequency of the enemy radar, i.e., to have receiving and analyzing devices as well as noise signal transmitters on this frequency. The essence of employing spot jamming consists of that reduction of the signal-to-noise ratio where the former (the aircraft's blip) cannot be distinguished against the background of the latter. If this requirement is successfully fulfilled the detection radar plan position indicator is jammed with false blips and the tracking radar does not receive the necessary threshold signal and its antenna ceases to track the target. But based on the experience of local wars western experts believe that the aircraft aboard which such a jammer is installed has to maneuver vigorously to evade enemy surveillance; otherwise the enemy may fire a surface-to-air missile in the direction of the source of emissions.

Barrage jamming was created simultaneously in a rather broad frequency band, usually under conditions where data was lacking about the parameters of enemy

radar emissions. The jamming must be sufficiently powerful to saturate a receiver's amplifier circuits to a level precluding amplification of the useful signal from the target. But the large output power of barrage jammers determines their impressive size, which does not permit them to be installed in fighters. Therefore the Israeli Air Force used a Boeing 707 EW aircraft passenger liner as a platform for this cumbersome equipment.

Imitative jamming conceals the signal reflected from an aircraft by creating blips on the operator's screen similar to target blips but shifted in bearing and range. As the foreign press reports, precise information is needed for this not only about the operating frequency of the enemy radar, but also about all other emission parameters of the radar.

One further method of cover and concealment often used in local wars is to have an aircraft fly in a strip ("cloud") of passive jamming formed by chaff. Foreign specialists regard the primary deficiency of passive jamming as the fact that it remains practically stationary in space (it moves only under the effect of the wind and the force of earth's gravity). Therefore it is necessary to employ special aircraft--chaff dispensers--to form a "concealing shield" between friendly fighters being sent into combat and the enemy. According to foreign press data during combat actions in the Near East Israeli chaff-dispensing aircraft would drop the chaff at high altitude in the morning hours, figuring that the "cloud" which formed would descend and be shifted by air currents into the combat zone by the time the fighters got there.

According to the western press, the concealment achieved in the approach phase by the use of EW capabilities provided favorable conditions for the beginning of the next, decisive phase of aerial combat--the attack. Here too, however, the electronics factor did not lose its importance. It continued to exert direct influence on the choice of the kind and profile of the attack as well as on its support. Foreign military specialists cite the following example as confirmation of this thesis.

The detection range of an air target with an effective reflective surface of 2 $m^2$ approaches 80 km for the AN/APG-63 airborne radar of the F-15 fighter when operating in the upper hemisphere scan mode, and some 50 km in the lower hemisphere scan mode (the AN/APG-66 radar of the F-16 aircraft has ranges of 56 and 28 km respectively). Equipped with airborne radars having identical characteristics, the pilot of the aircraft flying below the enemy detects him with a certain lead time. The time reserve during which the fighter remains as yet undetected permits counting on concealment in moving into the attack and determining its most advantageous profile (upward from below), assuring a later entry into the target aircraft's radar field of view.

The WEAPONS FACTOR. In the formula weapons were placed in the fourth power, which emphasized their special role in contemporary aerial combat. It was believed that new weapons with which third generation fighters were fitted will permit them to fight successfully at medium ranges, attacking targets chiefly on head-on courses. This was to have led to a revision of tactical concepts of combat and introduce substantial changes to the methods by which fighters executed their primary mission.

In analyzing results of aerial combat over Lebanon in June 1982, however, the journal FLIGHT cites the following indicators. Sidewinder short-range guided missiles were employed in the overwhelming majority of instances (more than 65 percent), guns were used to the same extent as in actions between second generation fighters (7 percent), and the AIM-7F Sparrow medium-range missiles were launched only in less than 28 percent of the cases, and most often without result.

In summing up this situation, foreign military experts note that the clear preference again was for short-range weapons and there was no revision of tactical concepts. Short-range aerial combat continues to be the basis of all fighter combat activity and their primary means for attaining air superiority, while medium-range weapons have not yet confirmed all the capabilities ascribed to them. The latter circumstance is explained as follows by the foreign specialists.

First of all, despite the removal of a number of restrictions blocking effective use of the Sparrow missiles in past modifications, its latest model, the AIM-7F, also "suffers" from substantial deficiencies. In order to hit an air target the pilot constantly has to keep it in radar lock-on, but a correctly executed maneuver by the enemy aircraft may interrupt the tracking and consequently the aimed launch of a missile. In principle the guided missile with semiactive radar guidance remained a weapon for intercept and not for maneuverable aerial combat.

Secondly, automatic tracking of a target has to be begun at a considerable distance from it in order to launch a missile on a head-on course, even at the minimum possible range. In addition, the need for mandatory radar detection, identification and illumination of the target "rivets" the sole crew member of the fighter (such as the F-15) to one enemy aircraft for a rather lengthy time (based on the yardstick of aerial combat). A surprise attack by another enemy aircraft which is not being tracked is possible in such a situation.

Thirdly, the entry into short-range maneuverable combat by a fighter equipped with medium-range weapons deprives it of the advantages for which half of the money spent developing the aircraft was used. As a result the actual results of such a fighter's actions based on the cost-effectiveness criterion will be enormously below estimated results, and in certain situations the advisability of employing it remains questionable.

Considering the above, many foreign military specialists assume that the employment of new medium-range weapons and the change in fighter operating tactics connected therewith largely depend on the presence of favorable conditions. In their opinion, the latter arise most often when intercepting high-altitude reconnaissance aircraft, bombers, as well as fighters which do not have the right to depart from a given course or which have lost vigilance and have not been warned of the threat which has appeared.

As the foreign press notes, the latest events in the Near East demonstrated once again that fighters far from always receive independence and freedom in

choosing tactics. For example, when screening ground troops in a given area, escorting bombers, or clearing the air space in the overflight zone of tactical fighters and above a strike objective, they are obligated by combat regulations to fly as part of a group and assure performance of the primary missions without being diverted to engage in aerial combat with enemy aircraft not threatening the screened forces.

At one time the journal INTERAVIA wrote that group aerial combat is the basic type of combat. Pilots must above all be fighters and only after that be interceptors. According to western specialists' views, group combat is a unification of everyone's efforts, but it is waged by individual participants. As a result the following tactical scheme took shape long ago: an air squadron (group) takes up the most favorable position for closing with the enemy, then follows the maneuvering, and combat breaks into engagements between pairs and single aircraft.

With respect to the question of employing third generation (all-aspect) weapons, the foreign press emphasizes that despite the relatively small number of attacks performed on head-on courses during the latest aerial combat in the Near East and their modest results, all-aspect combat has become a reality and has the following distinguishing features. Aerial combat conditionally is subdivided into four phases with consideration of the capabilities of new guided weapons: search, closing, attack, and disengagement. Close-range maneuverable combat has been excluded from this list.

All-aspect combat differs from the intercept typical of fighters and second generation weapons by the fact that the intercept provided for attacking a target while overtaking, but the new weapons permit it to be attacked from the forward hemisphere without executing additional maneuvers to get onto a pursuit course.

The closing and attack represent a single process without a noticeable transition from one phase to the other. The aiming and coarse direction of the weapon are done during the approach along a straight or slightly curved flight path.

All-aspect combat between fighters most often is head-on combat, with both sides attempting to resolve its outcome by attacking. A shift to the defense would signify the beginning of short-range maneuverable combat, but with the failure of a head-on attack the enemies usually lose visual contact with each other.

The exclusion of the close-combat phase and the merging of the approach and attack into an almost straight-ahead blow make all-aspect combat "instrumental" combat (not observing the enemy visually, the pilot makes a decision based on the situation display) and short-lived.

Despite the fact that a "duel" situation is most typical of such combat, it is group combat with a rather precise delineation of duties among crews in the combat formation. Western military specialists explain the latter situation as follows. If a fighter such as an F-15 detects a target on a head-on course

at a range of 80 km, then with a continuation of the zero angle of approach the transition to the target's automatic tracking occurs at a distance of around 50 km. With an increase in the angle of approach the lock-on range decreases, and becomes minimal on pursuit courses. Therefore the best conditions for an attack using medium-range missiles is "head-on" and, considering the electronics factor, also upward from below. It is rather difficult to create those conditions, i.e., to place the enemy aircraft in the position of a practice target. In this situation the fighter must be assisted by the other crews which are performing various tactical missions. As a result all-aspect combat, like close-range maneuverable combat, becomes group combat and is arranged on principles of interworking.

In addition, in the opinion of foreign experts, a fighter's capability to perform an independent radar search of the air enemy does not at all mean that he does not need target designation. With an independent search, after detecting the target at other than maximum range the pilot of a single-place aircraft may not have the time for a proper choice and execution of maneuver and he will not be able to attack the target. Therefore target designation is the duty of the command post observing the air situation to a considerably greater depth than the fighter preparing for all-aspect combat.

Fighter operating tactics which took account of the possibility of conducting attacks on a head-on course took shape during experimental exercises and actual combat in the Near East. The foreign press notes that as a rule the fighter combat formation was extremely spread out in altitude and included demonstration and strike groups (or aircraft). The demonstration group would occupy the upper layer and, using feints, it would place the enemy in a position convenient for attack by the strike group located below, and at times the demonstration group would support the attack (after performance of its primary mission).

AVIATION WEEK AND SPACE TECHNOLOGY described one of the instances of experimental aerial combat on head-on courses by a pair of F-15 fighters against two "enemy" aircraft as follows.

In the search phase the F-15 aircraft were proceeding in a combat formation on line at an interval of 2,300 m, the leader flying at an altitude of 4,600 m and the wingman at 6,100 m. The leader was using the airborne radar to view the upper hemisphere, and the wingman the lower (in the sector of $\pm 60°$). Targets were detected at a range of 74 km. After this the pilots turned on the identification system and the targets did not "respond" (the symbols for "friendly" did not appear on the screen next to the aircraft blips), so they were taken as the enemy. The leader set about to lock onto the nearest target, for which he used the strobe control knob (target designator) located on the engine throttle. When the strobes "framed" the target blip he pressed the lock-on button (on the aircraft control stick). All automatic tracking parameters appeared on the screen: permissible missile launch ranges (maximum ranges against nonmaneuvering and maneuvering targets--$R_{max}^1$ and $R_{max}^2$ respectively, as well as minimum range--$R_{min}$); the circular mark for permissible control error; command mark; target designation mark; overload symbols

(1.5 g), Mach numbers (the figures 944 signify that Mach = 0.944); and number of suspended missiles (M4). The symbolics of these parameters appeared simultaneously on the head-up display (Fig. 3).

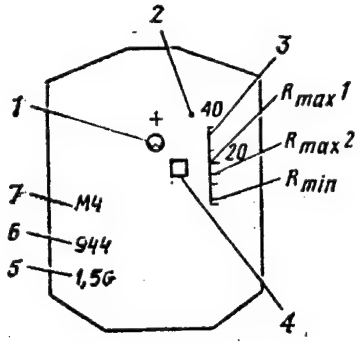


Fig. 3. Symbolics of head-up display guidance parameters:

1. Permissible control error circle
2. Control command mark
3. Range scale
4. Target designation mark
5. Overload
6. Speed
7. Number of missiles

The radar functioned with an average pulse repetition frequency (10,000 Hz) and when the distance to the target (shown on a vertical scale) reached the value of 1.2 $R_{max}1$ it automatically switched to high frequency emission (200,000 Hz) required for launching the AIM-7F Sparrow missiles. The pilot flew the aircraft by orienting himself on the target designation mark (a square 25 millirads on a side) which indicated the line of sight to the target, on the permissible control error circle, and on the command mark denoting the line of intercept. After the aircraft reached the range of permissible missile launch, data appeared on the display about the time left until the missile hit the target. The pilot pressed the firing button on the aircraft control stick when there were some 28 km to the target.

The closing occurred at a speed of Mach 2. The aircraft covered the distance from the target detection line to the line of minimum permissible launch range $R_{min}$ in a little more than one minute. The $R_{max}2$ index quickly dropped below the $R_{min}$ and employment of medium-range weapons became impossible. It was noted in the foreign press that only a trained pilot could react to the enemy maneuvers and precisely execute such complicated aiming operations. But even the skills did not help when the guidance system did not cope with the monitoring and recalculation of the lead. All these deficiencies were manifested clearly during aerial combat in the Near East.

Western military experts believe that one of the primary ways to solve this problem is to have maximum automation of all flight control processes including placing it in the vicinity of the target, searching for and locking onto the target, aiming, and firing. These experts pose the question of automating those processes which previously were the pilot's prerogative such as determining the degree of threat to his own aircraft stemming from a particular target, and the choice of the kind of maneuver, type of weapon and method of employing it. But since all systems and means which accomplish these missions are developed chiefly on the basis of electronics, the influence of the electronics factor on the course and results of combat again arises.

(To be concluded)



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# MULTIROLE FIGHTERS OF CAPITALIST COUNTRIES

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 1, Jan 84 (signed to press 5 Jan 84) pp 55-59

[Article by Engr-Col (Res) B. Ivanov and Engr-Capt (Res) G. Isayev]

[Text] In working up the arms race and pursuing clearly aggressive purposes, militaristic circles of imperialist states are comprehensively strengthening the tactical aviation of their air forces--one of the chief striking forces in fighting a war in a TVD [theater of military operations] with the use of nuclear and conventional weapons. The aircraft inventory of tactical aviation, including the so-called multirole fighters, also is being improved continuously. In the opinion of foreign military specialists, the presence of multirole fighters permits more effective accomplishment of assigned missions during an air operation through the rapid shift of large groups of aircraft from one assignment to another.

Judging from foreign press reports, the primary purpose of such fighters is the destruction of enemy aircraft in the air, destruction of ground and waterborne targets, interdiction of a combat zone, air support to ground forces, and aerial reconnaissance. They differ from other tactical aircraft by their optimum combination of high maneuverability and good altitude-speed characteristics. Multirole fighters usually are equipped with multifunction radars capable of detecting and tracking air targets, searching for ground and waterborne targets, determining the range to them, and supporting a flight in the terrain-following mode. These fighters' weaponry includes built-in rapid-fire guns and, on external suspension, air-to-air and air-to-surface guided missiles, NAR [free-flight rockets], conventional and guided bombs and cluster bombs. Western experts include among the advantages of multirole fighters the capability of accomplishing a large number of missions with an aircraft inventory of lesser size, which provides a considerable saving of funds. Moreover, the logistical system is simplified, aircraft maintenance and repair is facilitated, and expenditures for combat training drop.

The foreign press notes that a change in tactics of aviation's combat employment in the 1960's, when aircraft began to be used primarily at low altitude, led to a substantial degradation in the multirole capabilities of the F-4,

F-104 and other fighters. According to the concept of foreign specialists, these aircraft, which began to be developed back in the 1950's, were supposed to have the same high effectiveness in accomplishing all basic tactical missions inasmuch as they were being carried out under approximately equal conditions. The fighter would fly at high speed at high and medium altitudes and would hit air and ground targets using guided missiles of the appropriate classes (this comprised the concept of a multirole fighter). But in connection with the primary employment of aircraft at low altitudes the effectiveness of these aircraft fell sharply, especially in accomplishing attack missions.

Steps were therefore taken to improve the existing multirole fighters. The United States for example developed the F-4E aircraft (which became operational in 1967), intended to perform missions of winning air superiority, providing close air support to ground forces, and interdiction of the combat zone. In addition to the U.S. Air Force (for which 846 aircraft were built), it was supplied, with somewhat altered equipment, to the FRG (175 aircraft) and was manufactured under license in Japan (128). The aircraft differs substantially from previous modifications. In particular, it has a more powerful power plant, a wing with maneuverable leading-edge slat, a new radar, and improved Sparrow and Sidewinder guided missiles. At the same time, in the opinion of foreign experts, these improved fighters do not provide superiority in close combat against maneuverable fighters and have poor effectiveness in attacking ground targets and intercepting low-flying airborne targets.

The United States began developing the F-111 multirole fighter even earlier, in 1960. It was to have an intercontinental ferrying range and high speed characteristics, including supersonic speed near the ground. It was planned to be used as an air defense fighter as well as a platform for tactical nuclear weapons. Speaking at the ceremony on occasion of the completion of its construction, the U.S. secretary of defense at that time evaluated the F-111 "as the longest stride in development of a tactical aircraft in several decades."

The use of a variable geometry-wing, powerful and economical TRDD [turbojet bypass engines] and other innovations introduced for the first time in the F-111 were caused by the need to satisfy contradictory demands of the Air Force and Navy commands. The former in particular demanded that the aircraft provide close air support to troops, interdiction of the combat zone, delivery of nuclear strikes against enemy objectives and the winning of air superiority, while the naval command required lengthy air cover of a ship force during the sea passage, intercept of airborne targets, winning of air superiority and the destruction of ground targets. Requirements placed on take-off weight and geometric dimensions gave rise to lengthy discussions and agreements between these two departments. As a result the F-111B fighter variant developed for naval aviation possessed unsatisfactory flying altitudes and duration and did not have the capability of carrier take-off and landing, and so after several models were built the aircraft was removed from the inventory. The U.S. Air Force presently is using the F-111 as a fighter-bomber.

Subsequently American specialists temporarily gave up the idea of developing aircraft with universal characteristics and began the development of the new generation F-15 and F-16 multirole fighters. Although both of them are multirole fighters, the former is better adapted for combating airborne targets and the latter for accomplishing strike missions. Thus two more specialized aircraft appeared in place of the one F-4 multirole fighter. According to the Americans' concept, this was to increase the number and quality of missions accomplished. The foreign press notes that the F-15 aircraft has significantly greater capabilities in comparison with the F-4 in executing turns, accelerating and climbing to win air superiority. It is characterized by a low unit load on the wing, a high thrust-to-weight ratio and an advanced weapon control system. The possibility of the F-15's employment against ground targets as well was envisaged in its development. It is planned to use the aircraft's flying life as follows: 47.5 percent for performing intercept and conducting aerial combat; 32.5 percent for delivering strikes against ground targets; 20 percent for reconnaissance and operational training flights.

The F-16 fighter was developed with consideration of the latest achievements in aerodynamics, flight systems, design materials and power plants. The aircraft's basic technical features include an electroremote system for controlling all control surfaces with fourfold redundancy, a special shape in coupling the wing with the fuselage, a pilot's seat inclined 30° backward to reduce the high-g effect, and the use of automatically maneuvering leading-edge flaps for maneuvering. Missions assigned to the F-16 were expanded after it became operational. According to the foreign press, in the European war theater the F-16 must reinforce F-15 subunits during operations for winning air superiority in the initial stage of combat actions, then supplement the F-111 fighter-bombers and A-10 attack aircraft in delivering strikes against ground targets. In addition, it is planned to use them to replace the F-4 aircraft as nuclear weapon platforms. At the present time the F-16, which became operational in 1979, is becoming the most widespread fighter in the air forces of the United States and certain other member nations of the aggressive NATO bloc. Initially the American Air Force command planned to acquire 1,388 such aircraft including 204 two-place aircraft; then the procurement program was increased to 1,985 aircraft; now it is planned to take their number to 2,165.

Programs for phased modernization of the F-15 and F-16 fighters presently being carried out and planned to be completed by 1986 primarily consist of an improvement in the electronics equipment and missile weaponry. For example, programmable digital processors, memory units with increased capacity and new software are being developed for the radar. As a result, as American specialists assume, the radars will allow tracking of airborne targets while scanning and the isolation and tracking of individual targets flying in close formation. In the air-to-surface mode it will become possible to map terrain with a high resolution. Plans are to arm the fighters with the new all-weather AIM-120A air-to-air missiles with a medium range of fire. Modernization programs also provide for fitting the aircraft with improved EW equipment and new radio communications and navigation equipment.

In the opinion of western experts, despite the improvements being made the F-15 and F-16 fighters will not be able to function with sufficient effectiveness under certain conditions when delivering strikes against ground targets. The U.S. Air Force command for example believes that a further specialization of the fighters is advisable and so it is studying the possibility of developing F-15E and F-16E strike aircraft (Fig. 1 [figure not reproduced]). It is assumed that they will be able to fly at heights of 60-150 m in adverse weather conditions and will supplement the F-111 fighter-bombers in attacking targets located in the depth of enemy territory.

Judging from foreign press reports, since 1980 a number of American aircraft construction firms have been developing multirole fighters for subsequent sales to countries dependent on the United States. Two fighters--the F-20 Tigershark and F-16/J79--have been built and are undergoing flight testing under a program for developing such aircraft (denoted FX), but according to Pentagon statements they are not to exceed the F-16 and F-18 fighters in their capabilities.

Since 1980 the air forces of Great Britain, FRG and Italy have been receiving the Tornado multirole tactical fighter developed jointly by these countries under the MRCA--Multirole Combat Aircraft--program. The capability of performing the following primary missions was considered in developing it: intercept of airborne targets and winning air superiority, close support of ground troops, battlefield interdiction, destruction of waterborne targets, and performance of aerial reconnaissance. Judging from western press reports, the aircraft is distinguished by a high supersonic speed, high maneuverability in various flight regimes, a high rate-of-climb, low specific fuel consumption, relatively large combat load, large radius of action and high survivability. Foreign experts believe that by virtue of its characteristics the Tornado is capable of operating rather effectively against ground and naval targets but has limited capabilities in operating against airborne targets.

Each of the three aforementioned countries gives a certain preference to one or more missions performed by the aircraft: the FRG to delivery of strikes against ground and naval targets and to reconnaissance, Italy to providing air superiority, and Great Britain is developing a specialized version of a fighter-interceptor based on the Tornado tactical fighter. Projects for improving the Tornado are being studied to further improve combat capabilities and expand the scope of missions to be accomplished. It has been reported in particular that an escort fighter and reconnaissance aircraft have been developed and that the aircraft has been fitted with new individual electronic countermeasures and antiradar missiles.

France has begun production of the Mirage-2000 multirole fighter which is to replace the obsolete Mirage-3 and then the Mirage-F1 aircraft. It is intended for accomplishing the missions of intercept, close aerial combat, strikes against ground and naval targets, and reconnaissance. It is believed that versatility of the aircraft's employment is provided by its high aerodynamic qualities, the diversity of the combat load and presence of a multifunction radar permitting the detection and tracking of air targets, a search for

ground and waterborne targets, determination of the range to them, terrain mapping, and terrain-following flights.

As the foreign press reports, the main capitalist countries presently are drawing up requirements for future multirole fighters which will become operational in the 1990's. In studying the directions of fighter development foreign experts conclude that the problem of ensuring their multirole capabilities will become even more aggravated as a result of a further complexity of combat missions. Nevertheless they are convinced that multirole fighters must be developed in the future with high performance characteristics since only such aircraft will permit an offensive strategy to be realized and will assure superiority over enemy aviation.

According to requirements of the U.S. Air Force Tactical Air Command, the future ATF (Advanced Tactical Fighter) of the 1990's must have a small radar cross section, a sufficiently large payload with a corresponding flight range, improved maneuverability, supersonic cruising speed, short take-off and landing distance, as well as high reliability and small labor inputs for maintenance. To reduce weight and drag it is planned to make wide use in the aircraft's design of new materials and aerodynamic surfaces with a small thickness and aspect ratio. Being examined is the possibility of using a variable-geometry wing, a closely spaced forward horizontal fin, means for creating a special system for increasing wing lift for improving the efficiency of supersonic flight, improving maneuverability and reducing the take-off and landing distances. The control system for the fighter, power plant and weapons, brought together in a single automated complex, will, in the opinion of American experts, permit flying on a combat course along an optimum path and will improve the accuracy of weapon employment.

To provide for short take-off and landing it is planned to install two-dimensional engine nozzles with thrust-vector and thrust reversal control, more effective high-lift devices, and an undercarriage designed for operation from rudimentary and dirt runways. The possibility of a so-called conformal weapon suspension and extensive use of cluster bombs with small drag and of missiles launched outside the enemy air defense zones is being studied in the weapons area. It is planned to perform substantial automation and integration of airborne electronics and to use new EVM [electronic computers] and multifunction data displays. Specialists assume that miniaturization of electronics will permit a fundamental redesign of the cockpit, it will allow for easier aircraft and weapons control and it will replace mechanical with electrical systems.

The fighter's high performance characteristics (a combat radius of 1,100-1,500 km and ferry range of 5,500-6,500 km) are planned to be achieved to a significant extent by developing a new generation engine. American specialists believe that new materials and engine design arrangements will ensure the operation of assemblies and components of hot sections at higher temperatures and will permit obtaining high specific parameters and improving economy. A great deal rests on development of a new type of engine--a TRDD with variable operating cycle.

The foreign press indicates that during 1982-1983 several American aircraft construction firms offered the Pentagon their drafts of a future multirole fighter differing substantially in weight characteristics, design, and make-up of equipment and weapons (Fig. 2 [figure not reproduced]). It is noted that only the configuration of aerodynamic surfaces along the aircraft's longitudinal axis is common to the proposed designs. This has the purpose of improving the trim at supersonic speeds and with a change in the thrust-vector direction. Many designs plan the use of a forward horizontal fin, and one design has a variable-geometry wing.

It also has been reported that it is planned to appropriate some $400 million for fiscal year 1984 to perform research and development work for creating a future fighter, its power plant and equipment.

In Western Europe leading aviation firms of Great Britain, the FRG and Italy are using the experience of joint development of the Tornado tactical fighter to design an experimental ACA (Agile Combat Aircraft) which can serve as the basis for developing a future European multirole fighter of the 1990's. In the opinion of specialists of the British Aerospace firm, which is participating in the project, the aircraft (with a take-off weight of 15-18.5 tons) will be a relatively simple and highly maneuverable aerial combat fighter with high performance, capable of delivering strikes against ground targets. It will have a forward horizontal fin and a wing with a leading-edge break with sweep angles of 60° and of 40° toward the tip. It is planned to install an electroremote control system of the forward horizontal fin and high-lift devices in it (at the present time the system is being tested in the Jaguar fighter-bomber). The power plant will include two improved RB.199 TRDD's each with a thrust of 8,800 kg, which will provide a thrust-to-weight ratio of 1.2.

In France the firm of Dassault-Breguet has begun development of a twin-engine warplane of the 1990's intended for accomplishing an air superiority mission and delivering strikes against ground targets. A future TRDD, the M88 (with a thrust class of 7,480-8,440 kg) already is being developed for it. The tactical fighter's development will be preceded by construction of an experimental demonstration aircraft, the ACX (Avion de Combat Experimental), the testing of which is planned for 1985-1986. It is being made in the canard arrangement with a triangular wing and a break along the leading edge (Fig. 3 [figure not reproduced]). Two TRDD's will be installed in it with their air intake designed for flying at high angles of attack. In developing the aircraft it is planned to introduce the latest technical solutions including an automated control system, fiber-optic data transmission lines, multifunction displays, and a voice-operated control system. Much attention is being given to reducing design weight by using modern composition materials.

According to western press reports, Sweden also is developing a future multirole fighter. Swedish fighter-bombers, fighter-interceptors, ground attack aircraft and reconnaissance aircraft traditionally have been developed on the basis of a common airframe and have been distinguished by the modification to the power plant and make-up of airborne equipment and weapons. The new multirole fighter (which has been given the nomenclature JAS-39 Gripen, Fig. 4 [figure not reproduced]) is intended for intercepting air targets, conducting

aerial combat, and performing attack and reconnaissance missions. It has the canard arrangement and will have relatively small weight and size in comparison with the existing Viggen fighter. It is planned to make approximately 30 percent of design elements out of composition materials. It is believed that the aircraft will have enhanced maneuverability because of a high thrust-to-weight ratio, reduced static stability, and use of forward control surfaces.

The F404, a TRDD of American development with an 8,100 kg thrust during boost, already has been chosen as the power plant. It is planned to equip the aircraft with a multifunction pulse-Doppler radar with the following operating modes: search and tracking of several air targets at long ranges, lock-on of air targets at short range, control of the launch of air-to-air and air-to-surface guided missiles and of gun firing, search for ground and naval targets, terrain mapping with normal and enhanced resolution, and support to low-altitude flights and navigation. In addition it will be equipped with a suspended forward looking infrared system supporting the delivery of strikes against ground targets at night and under conditions of low clouds. It is believed that the future display system will permit reducing pilot load.

One built-in 27-mm Mauser gun is installed in the aircraft. When operating against airborne targets it will use contemporary and future air-to-air short and medium range guided missiles and when delivering strikes against ground and naval targets it will use conventional and guided bombs and cluster bombs, NAR, Maverick guided missiles and the new RBS.15 antiship guided missiles. It is planned to assure aircraft survivability with effective EW equipment, small geometrical dimensions of the airframe, redundancy of the most important components, and the use of self-sealing fuel tanks. The aircraft will be able to be operated from reinforced sections of road up to 9 m wide.

The foreign press notes that it is planned to build 30 JAS-39 aircraft before 1992 and 140 before the year 2000, including 26 in a two-place version. Flight testing of the new fighter is planned to begin in the mid-1980's.



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# AMERICAN MULTIFUNCTION RADARS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 1, Jan 84 (signed to press 5 Jan 84) pp 59-62

[Article by Engr-Lt Col V. Pavlov]

[Text] The Pentagon is placing certain hopes in achieving its aggressive plans on a network of military bases set up beyond limits of the continental United States and used primarily for stationing the most up-to-date weapons and military equipment, including capabilities of data collection and processing for automating the command and control processes. Such capabilities also include powerful multifunction radars with phased antenna arrays (FAR's), capable of simultaneously detecting, tracking and determining the purpose (identification) in aerospace of a large number of targets at a significant distance from U.S. territory.

One such station is the AN/FPS-108 Cobra Dane (Fig. 1 [figure not reproduced]) radar, which was deployed in 1977 at a U.S. Air Force base located on the island of Shemya (the Aleutians, Pacific Ocean). It replaced two obsolete radars (the AN/FPS-17 and AN/FPS-80), which previously were part of the Spacetrack space monitoring system. Judging from foreign press reports, however, in addition to performing space monitoring missions, the Cobra Dane radar is being assigned functions of an immediate warning of a nuclear missile strike as well as the collection, processing and analysis of data on the testing of missiles launched in the Pacific area. The radar has an antenna beam width of 0.6° and can detect targets in a 120° sector in azimuth and 79.4° in elevation. The bisectors of these sectors are oriented at angles of 319° and 40.3° respectively.

According to a statement by American specialists the Cobra Dane station permits detecting space objects with a radar cross section of from 0.1 $m^2$ or more in the altitude range of 140-46,000 km when operating in the space monitoring mode. In the warning mode, when the antenna beam is directed at an elevation of 1° and it scans only in azimuth, the detection range of targets with a radar cross section of 1 $m^2$ is some 3,700 km. In the missile test monitoring mode the radar usually operates not in the 120° sector of space surveillance in azimuth (259-19°), but only in strictly defined directions, particularly

the sectors 265-283° and 291-337°. Foreign experts believe that this makes it possible to make fullest use of the radar's power potential and assure detection of targets with a radar cross section of 0.3 $m^2$ or less at a distance of 3,700 km.

The station can detect and track up to 300 targets simultaneously depending on the operating mode. Tracking errors are 0.05° in angular coordinates and 4.5 m in range. Such measurement accuracy allows the prediction of missile impact points when monitoring their testing, with a circular error probable of some ±30 km and ±2 km laterally.

In the detection and tracking modes the Cobra Dane radar operates with signals which have a spectrum width of 1-5 MHz and are emitted in the frequency range of 1215-1250 MHz. The spectrum of signals utilized expands to 200 MHz and the range of operating frequencies is 1175-1375 MHz during identification, including when performing a detailed analysis of signature characteristics or measuring linear dimensions and radar cross sections of the targets being tracked. In this case the antenna beam scanning sector is limited to 44° for both angular coordinates. The station's signals, with a spectrum width of 1-5 MHz, are linear-frequency-modulated (LChM) pulses 150, 250, 500, 1,000, 1,500 and 2,000 microseconds long, with repetition frequencies of 400, 240, 120, 60, 40 and 30 Hz respectively, and signals with a spectrum width of 200 MHz are LChM pulses 1,000 microseconds long with a repetition frequency of 30 Hz.

To achieve high accuracy of radar measurement the radar takes account of the influence of the ionosphere, on which it obtains information by probing with LChM pulses with a repetition frequency of 30 Hz and duration of 1,000 microseconds with a spectrum width of 25 MHz. In addition, individual subsystems are calibrated for the introduction of corrections resulting from irregularities of radio wave propagation, alignment errors and other reasons. For example, calibration of angular coordinate measurement channels is performed on ISZ's [artificial earth satellites] with previously known coordinates and calibration of the radar cross section measurement channel is performed with the help of standard spherical reflectors.

The station also forms special signals intended for calibrating the range measurement channel and receiving-transmitting channel. The signals are LChM pulses with a 20 microsecond duration and a spectrum width of 5 MHz, emitted every 2 minutes during the radar's functioning in the direction of a passive reflector located in the far Fresnel region on Alaid Island (at a distance of around 18.5 km from the Cobra Dane radar).

The primary part of the Cobra Dane is the antenna system--a phased antenna array with aperture opening of about 30 m. The array includes 34,768 elements with a cylindrical shape and a diameter of around 12.7 cm (Fig. 2 [figure not reproduced]), of which only 15,360 presently are active, i.e., they are connected to the receiver-transmitter equipment, while the remainder are passive. The latter have dummy loads and serve primarily to help shape the radiation pattern and as a reserve for increasing the radiated power.

All elements of the phased array antenna are grouped in 96 so-called subarrays varying in area, each of which contains 160 active elements and a certain number of passive elements. In the subarrays in the central part of the phased array the distribution density of active elements is on the average four times higher than in the peripheral areas. American specialists believe that this method of shaping permitted an amplitude distribution of the field across the phased array aperture according to Taylor's Law and 35 db suppression of the side lobes relative to the main lobe. In addition, there was a reduction in losses inherent to phased array antennas with amplitude distribution and a smooth drop in field intensity toward the edges of the array. Monitoring of the subarray status is done by irradiating their elements through a special horn located in the near Fresnel region.

When operating on transmit, each subarray is connected to its own transmitter output stage through a combination of phase shifters and delay lines. The output stage consists of a traveling wave tube (TWT) with a peak power of 160 kw, distributed evenly among the active elements. The 96 output stages provide for a station peak power of 15.36 megawatts and its average power is 0.92 megawatts, with consideration of a certain ratio between duration of the emitted pulses and their repetition rate. When receiving, parametric amplifiers with a high amplification factor and low intrinsic noise level are connected to the output of the subarrays.

The transmit and receive modes are switched by the combination use of two halves of each subarray and a four-pole bridge connection. The output signal from a TWT supplied to one pole of the bridge connection produces a cophasal powering of both halves of the subarray, while phase shifters of the subarray halves provide an additional phase shift of 180° during reception for the parametric amplifier connected to the other pole of the bridge connection. This operating sequence easily lends itself to programming, which is considered an advantage in arranging software for the EVM [electronic computer] controlling the radar's operation as a whole and the position of the phased array beam in particular.

A monopulse method is used in the Cobra Dane in the target tracking modes, in which a sum and two difference radiation patterns (by azimuth and elevation) are formed. The outputs of all parametric amplifiers are connected to monopulse comparators (four to each one), forming 24 separate monopulse channels, to increase the effectiveness of this method. Final signal processing occurs in the digital processor with a preliminary addition of signals of the sum and difference channels with appropriate weighting factors for obtaining the requisite amplitude distribution. Before digital processing the broadband signals are demodulated in a special device. The basic element of the digital processor is a pulse compression unit which accomplishes spectral analysis of the received signals using the rapid Fourier transformation. The pulse compression unit permits processing incoming information at a rate of $1.5 \times 10^9$ bits per second.

After signal processing in the digital processor, the data enter the subsystem for controlling radar operating modes and data processing. Its basis is the Cyber 74-18 EVM with a memory of 131,000 words 60 bits long and a speed of

2.8 million operations per second. This EVM is used to assure a high degree of automation of the entire station's operation including the selection of the shape of emitted signals, establishing priority of information being processed, forming a data bank for transmission of data over warning channels, as well as monitoring basic radar characteristics and performing automatic troubleshooting.

In addition to the EVM this subsystem includes display devices located at appropriate consoles and functioning in modes of conversational interaction with operators. For example, at an operator's choice, search zones and tracked targets may be reproduced at display devices of the radar operation control panel. Playback of the situation at a slower rate and stopping frames for a detailed analysis is provided at display devices located at the data analysis console. Some display devices reproduce information in real time concerning the operation of individual radar subsystems and the status of various units. They are used primarily at maintenance consoles.

All basic equipment of the Cobra Dane radar is accommodated in a six-story building shaped like a truncated pyramid and 33 x 32 x 25 m in size. The side of the building on which the phased array antenna is accommodated is tilted 20° to the vertical, which allows the necessary radar field of view in elevation within the range of 0.6-80°.

The first floor of the building contains power supply equipment and heat exchangers and the second floor houses the transmitting equipment. The third floor is intended for installation of additional equipment for station modernization. Equipment operating with low power levels is installed on the fourth floor. The fifth floor is set aside for the Cyber 74-18 EVM, and the sixth floor is for the data transmission device, communications gear and other equipment. All high-frequency equipment including phase shifters, splitters for the common subarray power supply leads, parametric amplifiers and so on are accommodated on all floors in approximately a six-meter zone located behind the surface of the phased array. Considering the unfavorable climatic and geophysical conditions of the Aleutians, the radar building was designed in such a manner as to withstand the pressure of a wind of up to 300 km/hr and an earthquake of up to four on the scale.

The western press notes that after the Cobra Dane station was placed in operation one other multifunction radar with phased array antenna was developed, the AN/SPQ-11 Cobra Judy, accommodated on the "Observation Island" special-purpose vessel (Fig. 3 [figure not reproduced]). It is used chiefly to track missiles in flight on the terminal leg, which the Cobra Dane cannot see because of the limited range of direct visibility due to curvature of the earth's surface.

The Cobra Judy radar operates in a higher frequency range than the Cobra Dane. The station's phased array antenna contains 12,288 active elements. Sixteen TWT's are used in the output stages of the transmitter and are connected with the active elements by flexible waveguides of special design. Given temperature conditions are provided with the help of water cooling. The station uses several different forms of radar signals, processing of which (including

compression) is performed in digital form. The Cyber 174-112 EVM, as well as control consoles and display devices using cathode ray tubes some 55 cm in diameter make up the basis of the subsystem controlling operating modes of the Cobra Judy station. The very same display devices are contained in the Pave Paws radar.

The Cobra Judy radar is accommodated in a superstructure of cubical shape around 11 m high. It weighs almost 270 tons. Both electronic scanning of the phased array antenna radiation pattern in azimuth and elevation as well as the station's mechanical rotation in azimuth in a sector of 270° using a hydraulic servodrive is used to survey space.

The "Observation Island," aboard which the Cobra Judy radar is installed, was built in the 1950's. She has a displacement of 17,000 tons and a top speed of 20 knots. Her crew numbers 142, 60 of whom operate the radar equipment.

According to American specialists, joint operation of the Cobra Dane and Cobra Judy radars allows surveillance of missile testing from the moment they appear over the horizon at a distance of some 4,000 km until they impact in an area of the Pacific.



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## NEW AMERICAN TRAINER AIRCRAFT DESCRIBED

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 1, Jan 84 (signed to press 5 Jan 84) pp 71-72

[Article by Engr-Lt Col V. Yurtsev]

[Text] Along with a further development and improvement of combat equipment and weapons, the Pentagon's militaristic preparations place great emphasis on training personnel of all branches of the Armed Forces, including Air Force pilots. For example, the foreign press reports that one of the basic activities by the U.S. Air Force command to improve the quality of pilot training is to modernize the inventory of trainer aircraft intended for basic training. Requirements were drawn up for this purpose and competition announced for the best design of a new generation trainer, the NGT (Next Generation Trainer), in which five American aircraft construction firms participated. Only three of them--Fairchild, Rockwell International and Cessna--managed to submit their designs for Air Force examination by July 1982.

The design of a twin-engine trainer by the firm of Fairchild (with the Garrett engines) was declared the best. As the foreign press notes, it won out in such indicators as simplicity of operation and maintenance, and relatively low cost of the life cycle, design and production. In addition, it is believed that this aircraft meets Air Force requirements in its characteristics to the greatest extent (they are given below).

| | |
|---|---|
| Weight, kg: | |
| Empty | 2,140 |
| Maximum take-off | 2,870 |
| Flight speed, km/hr: | |
| Maximum | 800 |
| Cruising at altitude of 11,000 m | 560 |
| Service ceiling, m | 14,300 |
| Maximum flight range, km | 2,240 |

Flight duration at altitude of 4,500 m:
With consideration of fuel reserve for return to base airfield at distance of 550 km, hours..... 1.5

Take-off distance to height of 15 m, m..... 420

Landing approach speed, km/hr..... 185

It is also noted that far from the last role in the victory was played by the fact that in 1985 the firm completes production of the A-10A ground attack aircraft and its receipt of a new order from the Pentagon is a considerable financial support permitting it to place the production capacities being released under at least a partial load.

The new trainer (designated the T-46A) will begin to be received by the U.S. Air Force in 1987 to replace the obsolete Cessna T-37 of similar purpose. As the western press reports, an initial contract ($104 million) has been concluded with Fairchild for the aircraft's development, manufacture and flight testing of two experimental models, construction of an airframe for static and fatigue tests and construction of an engineering model of the engine. A contract also was signed with the firm of Garrett (initially $121.2 million are being allocated to it) which envisages the development, testing and delivery of 29 F109-GA-100 turbojet bypass engines for the T-46A. In addition, the firms will be given financial support by the Air Force both before the beginning of series production and during modernization of the industrial process in producing series aircraft and engines.

The American press notes that both contracts were concluded with consideration of so-called "fixed costs." This means that the firms must observe very strict financial discipline and not go outside the limits of funds stipulated in the contract. For example, if Fairchild exceeds costs of R&D and production by 25 percent or less (above that provided), then 85 percent of the excess amount will be paid by the Air Force and 15 percent will be made up at Fairchild's expense. A further increase in expenses for these purposes (above 25 percent) will be fully paid by the firm. If there is an increase in the initial cost of the order ($168.8 million) for the delivery of 54 aircraft the Air Force will pay the firm only 70 percent of the excess amount.

In addition to the basic contracts the Air Force is planning to conclude one more with Fairchild and Garrett for the development and manufacture of 44 flight simulators. The entire program of developing the new trainer aircraft including deliveries during 1987-1992 of 650 T-46A aircraft, 1,430 engines for them and 44 simulators is valued at three billion dollars.

Based on the experience of using the T-37 trainer presently in the inventory, the U.S. Air Force command advanced the requirement under which the new aircraft must have a twin-engine power plant and pressurized cockpit and must be fitted with improved ejection seats for the crew members, accommodated side by side, and an anti-icing system.

The design of the T-46A has the configuration of an unswept high-wing (with a span of 11.27 m and a 4° dihedral), twin-fin tail unit and tricycle landing

gear (see diagram [diagram not reproduced]). One feature of the aircraft is considered to be its low clearance (the height at the fins is 3.04 m), which makes it possible to use shortened struts (with a wheelbase of 2.26 m) retracting into the fuselage, as well as convenient access to a majority of assemblies and systems.

The 8.99 m long fuselage has an ellipsoidal shape in the longitudinal section, with its widest part being in the vicinity of the crew cabin. The nose portion gives the crew a 17° angle of view downward. It accommodates the forward electronics compartment and oxygen system units. The cockpit canopy is one-piece and rearward-hinged. The crew is accommodated in McDonnell Douglas ejection seats used in the A-10 attack aircraft and a number of other tactical aircraft. Folding steps are built on the sides of the fuselage for convenience of getting into the cockpit. Behind the cockpit is a baggage compartment and rear electronics compartment, behind which are the fuel tanks. The tail section of the fuselage, which contains units of the hydraulic and fire-fighting systems, the rudder control drive and certain other equipment, is 69 cm above the aircraft's axis of gravity, which allows a landing angle of around 20°.

The configuration with the upper position of the wing has certain inherent deficiencies. The most substantial deficiencies for a trainer aircraft, in addition to shading the horizontal tail unit at high angles of attack, is considered to be a restriction of visibility in making a turn and circuit flying, but the firm's specialists chose this very arrangement for two reasons. Firstly, in this case there is a sufficient angle (with low clearance) of flaps and ailerons which make up the high-lift devices. Secondly, in the future it is planned to use the trainer aircraft as a basis to develop its attack version by installing underwing pylons for weapon suspension. The firm hopes that the leaders of reactionary regimes of a number of Latin American and Near East countries may show an interest in such an aircraft as being a rather effective airborne weapon for so-called counterinsurgency warfare. U.S. Air Force experts also are interested in installing underwing pylons. In their opinion such pylons might be used for accommodation of additional fuel tanks or even to deliver a spare engine and other equipment for an aircraft which has made an emergency landing at another airfield.

It is believed that the relatively short fuselage tail section and the large area (in the overhead view) of its forward portion led to a need to develop the twin-fin tail unit (the tail span is 1.86 m), which provides the requisite equivalent area of vertical stabilizer and rudder. In addition, with this arrangement it will be possible to avoid having the vertical tail get into the wake of the engines.

According to western press reports, the F109-GA-100 engine will have the following characteristics: dry weight 180 kg, thrust around 670 kg, bypass ratio 5. It is being developed on the basis of the gas generator of the TPE331 turboprop engine using perspective technology which in the opinion of Garrett specialists will permit a significant reduction in fuel consumption. They believe that the new engine will have 10-15 percent less specific fuel consumption (in comparison with existing engines of the very same thrust

class), a lower noise level and lower life-cycle cost. Development of the engine and ground testing of its individual components continues at the present time. It is planned to begin flight tests of the T-46A aircraft in the spring of 1985 and series production in 1986. It is planned to become operational with the U.S. Air Force in 1987.



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## ANTISUBMARINE WARFARE TACTICS, COMMAND STRUCTURE DISCUSSED

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[Article based on views of the NATO command by Capt 2d Rank V. Khomenskiy]

[Text] The military-political leadership of the aggressive North Atlantic Alliance believes that the probable enemy's submarines are the chief obstacle in the path to attaining its goals at sea. In this connection it gives exceptionally great attention to the problem of combating them, including the SSBN's--ballistic missile platforms--and multirole submarines which threaten sea lines of communication [SLOC] and ship forces.

The foreign press notes that contemporary nuclear-powered strategic submarines have practically an unlimited radius of action and are capable of delivering surprise nuclear strikes against military, administrative and industrial centers both on the coast and in the depth of the territory. In the opinion of foreign specialists the great difficulty of detecting SSBN's deployed in the world ocean and the difficulty of intercepting and destroying missiles launched from them make the battle against them extremely complicated and difficult.

In pointing to an ever-growing dependency of the bloc states' economy on ocean and sea shipments of raw and other materials as well as to the need, in case of war, for accomplishing uninterrupted movements of reinforcing troops, weapons and various supplies from the North American continent to the European TVD's [theaters of military operations], western military specialists emphasize that submarine operations on the SLOC will have a substantial influence on the economic situation of NATO countries and will make a serious contribution to the course and outcome of a war.

The outfitting of submarines with nuclear propulsion plants and the latest weapons (in addition to the traditional torpedoes and mines they may have ballistic, antiship and cruise missiles and rocket-assisted torpedoes) considerably increased their tactical capabilities and made them a formidable force at sea.

The West combines the entire set of measures to combat submarines (primarily nuclear-powered submarines--SSN's) into the concept of antisubmarine warfare, which under present-day conditions has acquired strategic scope, as declared by NATO experts. Organization of the fight against SSN's capable of operating in vast parts of the ocean requires the mobilization of colossal physical assets and production resources and, in the opinion of foreign specialists, it is inconceivable within the level of a single state, even one such as the United States. It is for this reason that the desire of the NATO command to compensate for what it considers the existing shortage in strength of antisubmarine forces of each individual country by the unification of general efforts at the bloc level and to include the entire arsenal of forces and means of warfare to combat the submarines has been manifested most clearly in recent years. As the foreign press has reported, particular attention is being given to improving the organization of NATO's antisubmarine forces and to performing extensive studies connected with the development of new technical means for the search, detection and identification of submarines (including with the use of ISZ [artificial earth satellites]), with the development of contemporary models of antisubmarine weapons, and with the development of more effective methods and techniques of employing them.

A special scientific antisubmarine center of the NATO naval forces in the Atlantic located in the city of La Spezia, Italy, meets the objectives of coordinating the efforts of NATO countries in this area. Judging from foreign press materials, its primary missions are to study fundamental problems of antisubmarine warfare and provide scientific and technical assistance (consultations) to the Supreme Command of NATO OVS [Joint Armed Forces] in the Atlantic on matters of conducting ASW; assisting in the development of programs of national commands, especially of small states, to perfect forms and methods of combating submarines; and the exchange of scientific-technical projects being carried on by various laboratories and organizations in the sphere of oceanography, hydrography and hydroacoustics. The nature and direction of the center's research indicate the comprehensive preparation by NATO naval forces for effective antisubmarine warfare.

Bloc naval forces have developed two concepts of conducting antisubmarine warfare: containment and defense in depth.

The foreign military press indicates that geographic conditions for the basing of enemy submarine forces comprise the basis of the first concept. According to this concept their deployment from bases must be hindered by blockading key positions (such as the Greenland-Spain-Great Britain line and others) and delivering strikes against basing points. It is believed that success of operations at the lines will depend largely on the time it takes to deploy them fully. In addition, in case of war the emergency build-up of ASW forces operating here even during peacetime conditions is envisaged. The containment concept is essentially a component part of the NATO concept of "forward lines" and, along with a blockade of strait zones, presumes the winning of sea supremacy.

A defense in depth is organized to combat those enemy submarines which were deployed in tactical mission areas before the beginning of containment

operations or which were able to penetrate the antisubmarine barriers during the operations. While attaching great importance to the destruction of submarines directly in naval bases and realistically evaluating capabilities of the forces to be used for these purposes, foreign military specialists do not believe that the degree of the underwater threat can be reduced substantially as a result of strikes against bases. Therefore they assume that primary efforts must be focused on ASW on the deployment routes and directly in the battle zone practically to the entire depth of the ocean or sea TVD.

Overall direction of the organization and conduct of ASW in NATO's zone of responsibility is assigned to the strategic command of NATO's OVS in the Atlantic and in Europe and to the NATO Channel Command, which through staffs coordinate the activities of subordinate high commands (or commands) in the zones and areas of sea TVD's. Their functions include the development of plans for operational use of ASW forces within their theaters, allocation of forces among their subordinate commands, assignment of missions, coordination of operations and organization of coordination with other commands in conducting ASW operations.

Special centers for control of ASW forces have been set up for immediate direction of ASW operations under NATO OVS staffs in the West Atlantic (Norfolk, USA), East Atlantic (Northwood, UK) and Iberian Atlantic (Lisbon, Portugal), in the North European TVD (Kolsos, Norway), and the South European TVD (Naples, Italy). Their primary functions are assigning missions to national naval forces for reconnaissance and antisubmarine surveillance in assigned zones, analysis and evaluation of incoming data, providing systematic information to the command element about the underwater threat, as well as coordinating the work and arranging for interworking of intelligence agencies of bloc member countries.

The NATO Joint Naval Forces do not have permanent ASW forces and weapons at their disposal in peacetime with the exception of the permanent NATO naval force in the Atlantic. It is planned to transfer them from national navies in a threatened period or when war starts. Deployment of these forces (prior to the beginning of combat actions or under wartime conditions) is to occur on the basis of a system for ASW surveillance and tracking of each SSBN, already developed and worked out in peacetime. It is based on the principle of centralized data collection on the underwater situation from all forces and means at sea, in the air and in space. This includes above all the SOSUS fixed long-range sonar surveillance system, submarines, ships and vessels making passages, in combat training areas or performing special reconnaissance missions, land-based patrol aircraft, and spaceborne and shore-based communications and electronic intelligence capabilities. The organization of antisubmarine surveillance of NATO naval forces in the Atlantic and in the Channel is shown in Figure 1.

As the foreign press reports, the basis of the SOSUS system consists of American long-range sonar surveillance stations capable of making the initial detection of submarines and determining their areas and movement elements. Land-based patrol aircraft and surface combatants are vectored to the detected submarines based on SOSUS data. The system's shore stations with passive

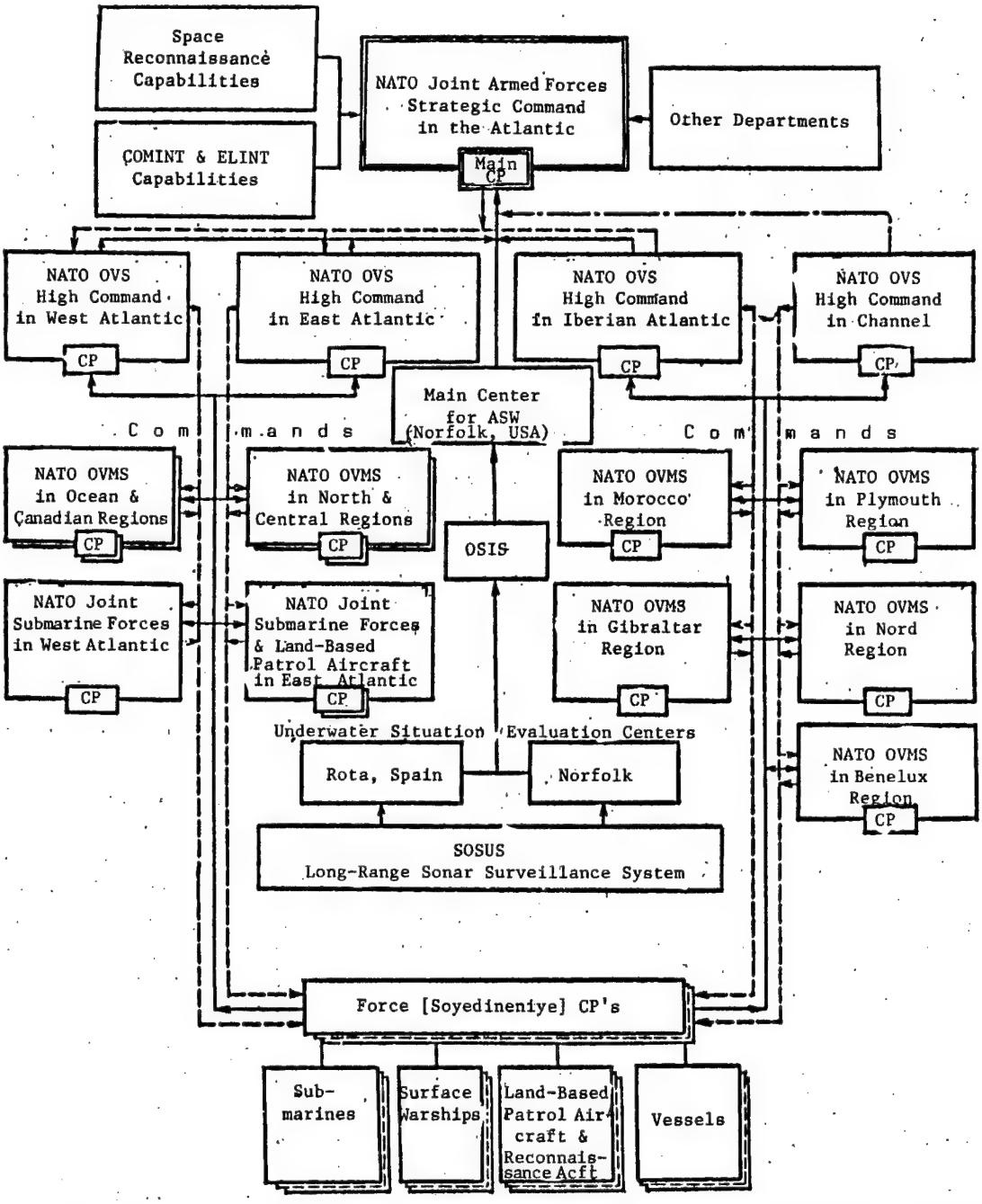


Fig. 1. Organization of antisubmarine surveillance by NATO naval forces in the Atlantic and in the Channel; conventional abbreviations and symbols:

NATO OVS--NATO Joint Armed Forces
Main CP--Main command post
CP--Command post
OVMS--Joint Naval Forces
OSIS--Ocean surveillance information system
—— --Report
--- --Notification and instructions
-.- --Coordination

sonar arrays on the seabed and the maneuverable ASW forces form a single complex for tracking submarines in vast parts of the Atlantic. In peacetime the control of SOSUS is assigned to the U.S. Commander in Chief of the Atlantic Fleet (with headquarters at Norfolk). Under emergency conditions all system stations located both on the North American continent and in a number of bloc European countries are to be transferred to the subordination of NATO's Supreme Allied Commander Atlantic and used to guide maneuverable ASW forces to detected enemy submarines.

In analyzing present-day capabilities and development prospects of maneuverable ASW forces, western military specialists believe that submarines themselves, primarily nuclear-powered multirole submarines, are the most effective means in fighting submarines. Numerous foreign press reports serve as confirmation of this, where it is emphasized that SSN's spend up to 70 percent of their running time specifically to participate in antisubmarine exercises. In addition to accomplishing the missions of combating enemy submarines at exits from bases, on transit routes and in combat zones, they also are called upon to provide combat support to SSBN's, carriers, landing detachments and convoys; to lay offensive minefields; and perform reconnaissance. Special significance is attached to the timely detection of the beginning of enemy submarine deployment in tactical mission areas. It is believed that patrols of nuclear-powered submarines must be established at previously designated locations on the near approaches to enemy bases to accomplish this mission.

Judging from western press materials, it is planned to use the SSN's singly and in groups as well as in coordination with ASW warships, aircraft and helicopters. Their operating methods will be chosen with consideration of the situation and assigned missions. One of them will be patrolling in forward areas. Geographic features, the tactical situation, the assumed width of the zone of enemy submarine movement, the way in which the SOSUS system has been equipped, and the size of friendly forces assigned to accomplish this mission are taken into account in selecting an area and choosing its size and configuration. If several SSN's are sent to a given area each of them is assigned her own patrol zone and she is permitted to go beyond it only after completion of the planned stay in the area or on command. Under this method, called the "positional" method, a submarine patrols within the limits of her designated zone at slow speeds and at depths which assure greatest concealment from enemy surveillance facilities along with maximum range for detecting the enemy. Diesel submarines also may be used for patrolling, but in this instance the zones assigned to them are substantially decreased. It is prescribed that submarines evade detection by enemy ASW forces by moving out of their search zones and, if contact is established, to employ a break-off maneuver by sharply changing course, speed and submergence depth and simultaneously using sonar countermeasures (if the patrolling does not bear a demonstrative nature).

It is believed that present-day submarines fitted with sophisticated sonar systems are capable of accomplishing missions of hunting targets in the passive and active modes, tracking them and issuing target designations to fire directors. According to the foreign press, the detection range of underwater targets in the direct listening mode may be 50-90 km. Submarines'

primary ASW weapons are the SUBROC missile system, wire-guided and homing torpedoes (Mk 37, Mk 45, Tigerfish and others) and mines (Mk 60, MCC23C, VSSM600 and so on).

Land-based patrol aircraft with high mobility, maneuverability and a significant destructive potential are given a special place in ASW. According to foreign press reports the navies of NATO countries have more than 350 land-based patrol aircraft, the most up-to-date of which are the Orion, Nimrod and Atlantic. Their armament includes a considerable set of ASW weapons (mines, torpedoes, depth charges); sonobuoys (RGB) of the Jezebel, DIFAR, Julie, CASS and DICASS systems; search radars; television; gas-analysis and infrared equipment; and magnetic detectors.

The aircraft may hunt and destroy the submarines both independently and in coordination with other forces. Data of the SOSUS system are used extensively to vector aircraft to an area where a submarine is located.

A submarine is detected in a likely area by passive sonobuoys of the Jezebel system dropped in a certain pattern. Signals from them are received and analyzed by the airborne equipment of an aircraft patrolling at a speed of up to 380 km/hr at an altitude of 150-600 m. At least three pairs of Jezebel sonobuoys or two passive buoys of the DIFAR system are put in place additionally to refine the submarine's location. In the opinion of NATO naval specialists, operation of these buoys permits reducing the hunt area to 50 $km^2$. To develop initial data for use of ASW weapons by the aircraft, a precise determination of the submarine's location and her movement elements is performed using magnetometric equipment or active sonobuoys of the Julie, CASS and DICASS systems. In independent operations an aircraft flies in a designated zone, usually at a considerable distance (up to 1,500 km) from the air base. The optimum flying altitudes for using the magnetic detection gear are considered to be 50-150 m, or 150-1,500 m for a radar search.

It is believed in the West that despite a certain reduction in the role of surface combatants in the general ASW system in connection with the appearance of SSN's, these warships remain an important aspect in combating submarines. ASW operations can be carried on above all by destroyers, frigates, small antisubmarine ships (corvettes) and patrol boats. But even URO [guided missile] ships intended primarily for fighting enemy surface forces can hunt and destroy submarines by virtue of the presence of detection equipment and ASW weapon systems aboard them. A significant role in ASW is set aside for antisubmarine carriers of the British Navy ("Hermes," "Invincible" and "Illustrious"). In addition, multirole aircraft carriers and helicopter assault carriers with ASW aircraft and helicopters aboard are used for accomplishing antisubmarine missions, albeit on a limited basis.

The role of surface combatants reduces primarily to patrolling in strait zones and narrows, tracking submarines at antisubmarine barriers, participating in antisubmarine operations as part of ship hunter-killer groups, and providing escort for landing detachments and convoys. Included in the ship's ordnance are sonars (GAS) and radars; communications and electronic intelligence stations; the ASROC, Malafon and Ikara antisubmarine missile systems

(PLRK's); the Terne, Bofors, Limbo, Mk 54, Squid and Hedgehog depth-charge launchers/mortars, torpedo and mine ordnance, and ASW helicopters. U.S. specialists link great hopes with the outfitting of combatants with sonars with a towed antenna array operating in the passive mode and, as they state, capable of detecting submarines at a range of 40-300 km (depending on sea hydrology).

Helicopters have seen extensive development in NATO countries in recent years. Being an inseparable part of ship armament, the helicopters considerably expand ship capabilities for hunting and destroying the underwater enemy. The helicopters' operating zone exceeds by 15-20 times the range of fire of modern antisubmarine missile systems (for example, it is some 350 km for the Sea King). Helicopters have substantial advantages over a ship in use of capabilities for detecting and destroying submarines. For example, airborne dipping sonars, operating with much less interference, have greater effectiveness.

Helicopters can interwork with antisubmarine aircraft for a more precise determination of the location of a submarine they have detected, and also if ships are a considerable distance from her. They are outfitted with dipping sonars, magnetic detection gear, sonobuoys, antisubmarine torpedoes, and depth charges. They have high speed for surveying an area and are capable of appearing over a submarine suddenly and establishing contact with her before she is able to evade detection, and they can track a target for a longer time. The helicopter's basic deficiency is the difficulty and at times the impossibility of using it in bad weather.

The commanders in chief of the bloc's joint naval forces, joint submarine forces and land-based aircraft in the corresponding sea TVD's (zones) exercise immediate direction of antisubmarine forces assigned to NATO. In wartime it is planned to transfer to them the bulk of NATO member country navies (500 warships, up to 60 nuclear-powered and 130 diesel-powered submarines, more than 350 land-based patrol aircraft and 190 helicopters).

It is planned to set up the most powerful grouping of ASW forces in the East Atlantic. Its chief missions are to establish continuous supervision over the deployment of enemy submarines in a threatened period and to destroy them during combat actions to keep them from NATO's transatlantic lines of communication. It is planned to include in this grouping up to 70 nuclear-powered and diesel-powered submarines, approximately 170 destroyers and frigates and around 100 land-based patrol aircraft. In addition one or two American carrier groups may be deployed in the Norwegian Sea from NATO's attack fleet in the Atlantic and will be capable of combating submarines along with the destruction of surface forces.

It is planned to focus main efforts in the forward zone on antisubmarine barriers. The foreign press emphasizes that they usually are set up in narrows and straits on likely transit routes of enemy submarines. They consist of a complex of fixed assets (sonars of the SOSUS long-range sonar surveillance system and minefields) and maneuverable forces (ships, nuclear and diesel submarines, aircraft and helicopters) intended for detecting and identifying submarines, tracking them, and destroying them within a certain limited area (Fig. 2). In the opinion of western naval specialists, ASW barriers may be set up in the following parts of the Atlantic and adjacent

seas: Spitzbergen Archipelago--Bere Island--north coast of Norway; Greenland--Iceland--Faeroes--Shetlands--west coast of Norway. It is planned to direct

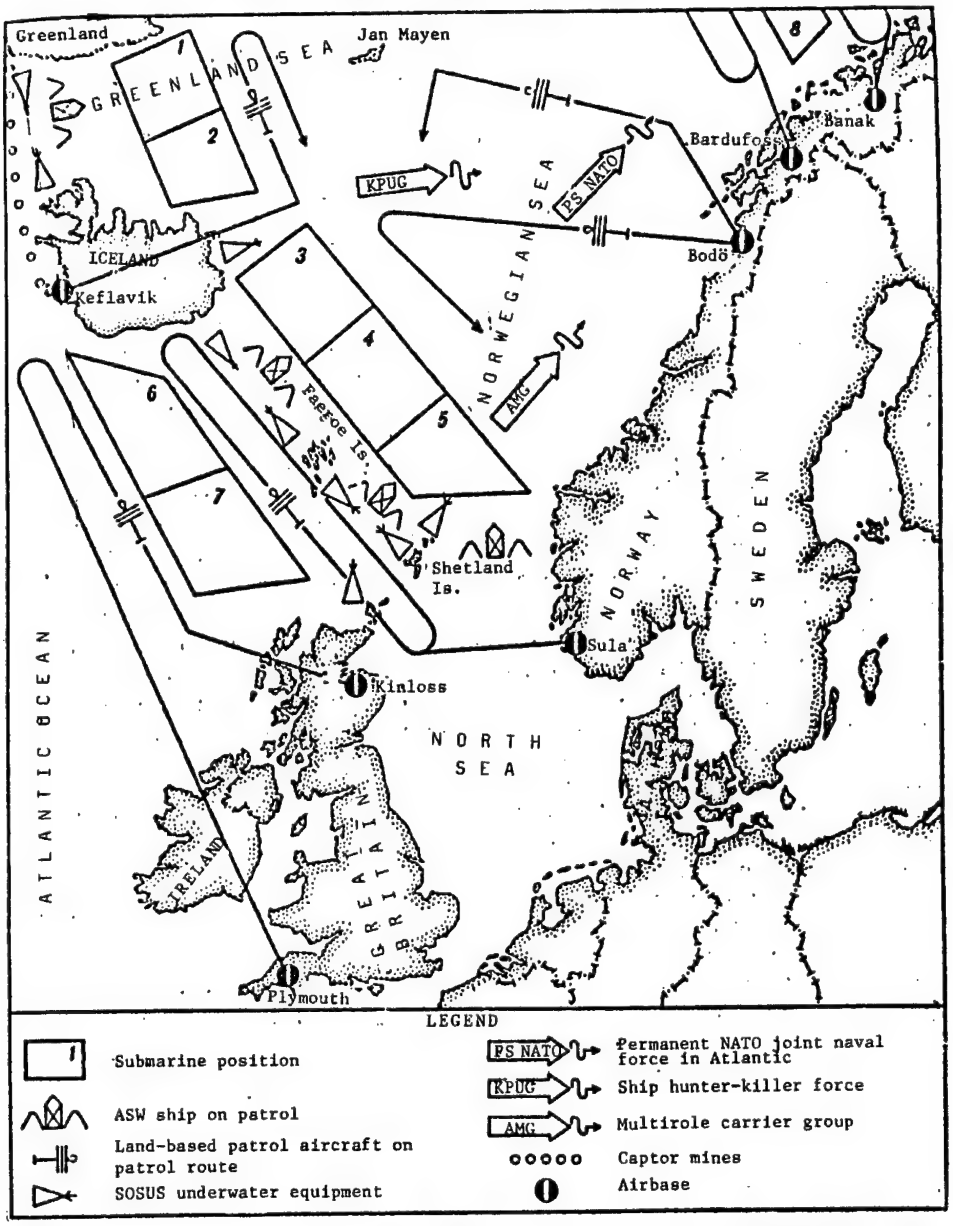


Fig. 2. Variant of antisubmarine barrier organization in the Atlantic

the navies of NATO countries toward destroying submarines which are penetrating or have penetrated the barriers and toward protecting areas of deployment and tactical maneuvering of attack groupings, including carrier groupings, as well as SSBN's on patrol.

The primary mission of ASW forces in the West Atlantic is ASW on approaches to the east coast of the United States and Canada. As the foreign press reports, the plans are to assign 20 nuclear and diesel submarines, up to 80 destroyers

and frigates and some 150 land-based patrol aircraft for this. Combat actions will be conducted by ship hunter-killer groups (KPUG) on the antisubmarine barriers (Canadian and Newfoundland barriers) and in restricted areas of the sea, with extensive use of assets of the fixed SOSUS long-range sonar surveillance system and U.S. Navy land-based patrol aircraft. Submarines will patrol in the most likely areas of enemy SSBN deployment.

The chief mission of ASW forces in the Iberian Atlantic will be protection of the junction of SLOC in the Strait of Gibraltar, important to NATO. This mission is to be accomplished by arranging for the escort of convoys and conducting a systematic hunt and destruction of submarines throughout the zone by forces of the fleets of Portugal, Great Britain and Spain (up to five submarines and 30 ships) in close coordination with NATO joint naval forces in the central region of the East Atlantic.

Plans are to conduct ASW in the channel zone primarily on its western approaches and in the southern part of the North Sea with naval forces of Great Britain, the Netherlands and Belgium (approximately 20 combatants, 3-4 diesel submarines and around 10 land-based patrol aircraft). Primary emphasis will be placed on escorting convoys and lone vessels during passages through the English Channel and Strait of Dover.

It is proposed to conduct ASW operations in the zone of the Baltic straits as part of the overall package of accomplishing missions of winning supremacy in the Baltic Sea and blockading the strait zone from the west and east. ASW forces may number over 100 warships, 20-30 submarines and up to 20 land-based patrol aircraft. Such a grouping may be reinforced if necessary by the permanent NATO naval force in the Atlantic. Highly mobile groups of torpedo boats also will be sent to fight submarines. It is planned to lay offensive minefields at exits from bases and on deployment routes of enemy submarines; in the assessment of the NATO command, these fields will be an essential component element of the forces and means of warfare in a TVD. For minelaying, plans are to make wide use of submarines of the FRG and Danish navies, capable of making a concealed passage and laying mines in the immediate proximity of the enemy coast.

Submarine hunting/killing in the Mediterranean is to be done at tactical ASW barriers in straits (Tunis, Gibraltar, Malta, Messina, Corsica, Kithira, and Bonifacio) as well as in narrows and restricted areas of the sea. As the foreign press reports, up to 80 ships, 60 submarines (primarily of NATO Mediterranean countries), and 80 land-based patrol aircraft may be assigned for these purposes. Plans for conducting combat actions in the Mediterranean also envisage extensive use of mine ordnance, which will contribute to the accomplishment of antisubmarine missions, especially in strait zones and narrows.

Great importance is attached to the antisubmarine defense of carrier groups and convoys in the overall ASW system. The foreign press points out that such a defense is arranged according to the principle of a concentration of efforts on threatened axes to a depth of 150-200 nm and usually is arranged in two zones: near and far. Operating in the near zone are up to eight escort ships disposed around the perimeter to create a continuous ring of sonar

surveillance at a distance equal to 1.75 times the effective sonar range, as well as ASW helicopters from a carrier or the escort ships. Their primary mission is to prevent an enemy submarine from making a torpedo attack in case she penetrates the far antisubmarine defense zone. Helicopters are disposed primarily in bow quadrants 20 nm from the carrier, i.e., beyond the effective range of the ships' sonar assets.

Forces in the far zone include some six S-3A Viking ASW aircraft (which hunt the underwater enemy within limits of 100 nm from the carrier), one or two SSN's (located 40-90 nm ahead of the carrier's path), one or two ship hunter-killer groups, and land-based patrol aircraft (which fly at a distance up to 200 nm from the carrier). The mission of these forces is to prevent an enemy submarine from taking up a position suitable for delivering missile attacks against the carrier.

The SSN's may operate either independently or under control of a relay ship which maintains stable communications with them and with the commander of the carrier group. In the opinion of foreign military specialists, the use of nuclear submarines as part of escort forces substantially improves the effectiveness of the carrier group's antisubmarine defense in all phases of its deployment and tactical maneuvering.

The antisubmarine defense of convoys and vessels at sea is arranged according to a zonal principle and has an organization similar to a carrier's antisubmarine defense. The make-up of forces assigned for these purposes by zonal commands of the joint naval forces may vary depending on the number of vessels in a convoy, the convoy's alignment, the expected enemy underwater threat, and geographic conditions of the area of passage.

Correct forecasting of environmental conditions can have considerable influence on the planning and conduct of antisubmarine operations in sea and ocean TVD's: sea state, ice cover, velocity of sound propagation in the water, water temperature and so on. Reliable knowledge of these parameters will permit more effective use of the sonar equipment of submarines, ships and antisubmarine weapon systems. A special system for collecting oceanographic data about the world ocean area and forecasting the situation in all ocean and sea TVD's has been set up and is functioning in the United States for oceanographic support to the activities of antisubmarine forces.

Necessary information comes from ships, submarines, oceanographic and merchant vessels, land-based patrol aircraft, carrier-based aircraft, anchored oceanographic buoys, and ISZ over radio communications channels and by facsimile to shore long-range forecast centers which provide antisubmarine forces with 5-30 day forecasts. Shipboard centers for short-range forecasts and for display of the oceanographic situation, located aboard carriers, issue detailed forecasts for a combat zone for a period of up to 48 hours. The forecasts consist of a set of charts containing plotted parameters which affect the operation of sonar equipment.

Practical implementation of such basic principles of conducting ASW as centralized direction of antisubmarine operations conducted to the entire depth of an ocean or sea theater from enemy submarine bases to the areas of their tactical employment, use of the entire complex of forces and assets for combating submarines, constant tracking of submarines in peacetime and readiness to destroy them with the beginning of a war, improvements in ASW organization, and a search for new forms and methods of combating submarines involve the development of weaponry, an intensification of the arms race, and a growing threat of new world war. All this requires high vigilance and constant readiness by the personnel of our Armed Forces to defend the socialist homeland.



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# TICONDEROGA CLASS GUIDED MISSILE CRUISERS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 1, Jan 84 (signed to press 5 Jan 84) pp 84-88

[Article by Capt 1st Rank (Ret) Yu. Petrov]

[Text] Unwinding a new spiral of the arms race, U.S. military-political circles are increasing their naval forces in numbers and improving them in quality. In particular, the guided missile cruiser "Ticonderoga"--the lead ship in a series of 26 units (see color insert [color insert not reproduced])--was commissioned in January 1983. In covering this event the foreign press notes that the most modern surface combatant embodying the latest achievements in shipbuilding has entered the U.S. Navy's order of battle. The order for her construction was issued in September 1978 and since then orders for construction of another six ships have been placed. The new cruisers are being built at the Litton Industries yard (Pascagoula, Mississippi) and subsequently also will be built at the Bath Iron Works yard. The total cost of the program at present, in the estimate of foreign specialists, is some $27 billion (in 1982 prices).

The primary mission of "Ticonderoga" Class cruisers is to combat airborne, waterborne and underwater targets when operating as part of a multirole carrier group and a ship striking force. In addition, by virtue of their multirole mission the ships may be used for actions as part of amphibious forces and convoys, for escorting groups of transports and underway replenishment tankers, as well as for fire support during the landing of an assault force and for performing reconnaissance.

The ship's design is based on the hull and main power plant (GEU) of the destroyer "Spruance," which allowed an acceleration and reduction in cost of her construction, a simplification in maintenance and the supply of spare parts, and made it easier to train personnel. Methods of designing a ship as a comprehensive weapon system including her hull, armaments, combat and technical facilities and personnel saw further development. Great emphasis was placed on the accommodation of various systems and on the conditions for their functioning. Above all this concerned electronics, since the considerable amount of varied antenna devices, which create mutual interference during operation, required optimal conditions for their accommodation.

One of the most serious problems posed for the ship's designers was to develop such a hull architecture and the structures of her sections and units that it would be possible to modernize them without great physical inputs and in a comparatively short time. The foreign press notes that such a task stems from the experience of operating U.S. Navy ships, which shows that they usually undergo two modernizations in the course of their 25-30 years of operational life.

The ship's basic tactical-technical characteristics are given below.

| | |
|---|---|
| Full displacement, tons | 9,600 |
| Principal dimensions, m: | |
| Length | 172.8 |
| Beam | 16.8 |
| Draft | 9.5 |
| Range (at speed, knots), nm | 6,000 (20) |
| Full speed, knots | 32 |
| Fuel capacity, tons | 2,000 |
| Crew | 360 (of whom 33 are officers) |

The foreign press has reported that the new cruisers are being built on a flow line by the sectional-unit method (the ship is broken into ten units and sections) with modular installation of package equipment and an initially high degree of saturation of the section with the equipment (Fig. 1). The ship has a hull with a forecastle erection extended far to the stern for 85 percent of her length, a clipper bow and transom stern. The hull lines are designed to decrease the amplitudes of rolling and pitching motion and the water's resistance to the ship's movement. Based on experience of operating "Spruance" Class destroyers, the ship's overall length was increased 1.1 m by lengthening the bow portion and a bulwark some 40 m long and 1.4 m high was installed on it to reduce the effect of waves and spray in stormy weather on the bow installations--the gun mount and the general-purpose missile launcher. The cruisers are outfitted with a motion stabilization system and bilge keels for this same purpose. According to the design the ship is to maintain a speed of 20 knots for a lengthy time with a sea state of 7. Smokestacks are distributed along the sides and along the legnth of the ship. Lattice masts rise behind the flying bridge and in the middle portion of the superstructure. The task of improving shock-resistance and explosion-resistance of hull structures and equipment was set in the design stage. A semiautomatic emergency system informs the command element of the nature and extent of damages with the help of special sensors and permits remote closing of hatches and doors to prevent the spread of fire and water.

The design provides for use of various sound-absorbing devices and quiet power equipment manufactured under specially developed technology. A five-bladed variable pitch propeller (VRSh), with air supplied to the leading edges of the blades to reduce cavitation noise, was chosen as the propulsion device. It is expected as a result of these innovations that this ship's noise level will be less than that of other surface combatants of the U.S. Navy.

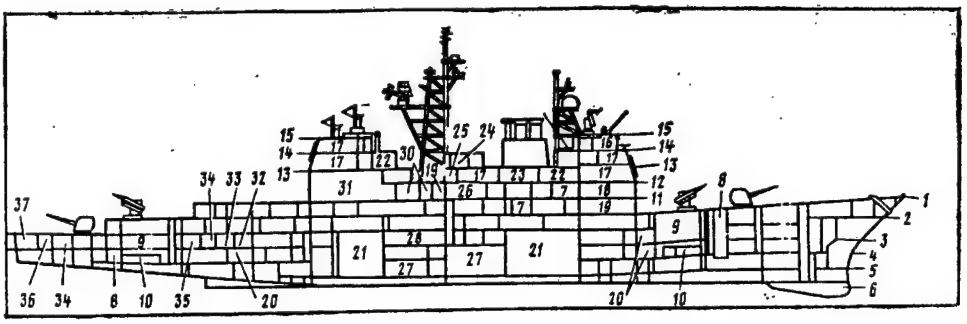

Fig. 1. Inboard profile of guided missile cruiser "Ticonderoga" along centerplane:

1. Forecastle
2. Main deck
3, 4, 5. Platform decks 1, 2, 3
6. AN/SQS-53A sonar antenna
7. Compartments with AN/SQS-53A sonar equipment
8. Ammunition supply trunk
9. Missile magazine
10. Missile spare parts storage
11, 12, 13, 14, 15. Platform decks 01-05
16. Flying bridge
17. AN/SPY-1A radar equipment room
18. Combat information center
19. Computer room
20. Gyrocompass room
21. Turbine room
22. Electronic equipment repair shop
23. AN/SPS-49 radar equipment room
24. Vulcan-Phalanx gun system equipment room
25. TACAN RNS [radio navigation system] equipment room
26. Radio room
27. Auxiliary machinery room
28. GEU central control station
29. Communications equipment store
30. Aviation equipment repair shop
31. Hangar
32. Electrical equipment repair shop
33. Ordnance shop
34. Battery shop
35. Power equipment repair shop
36. AN/SLQ-25 equipment room
37. AN/SQR-19 sonar equipment room

The ship's design also makes wide use of new durable materials (aluminum alloys, plastics, wear-resistant coatings and so on). Ammunition magazines are protected by 25-mm steel plates. The most important parts of the superstructure are additionally protected by honeycomb panels. The upper deck has a vinyl coating. In comparison with other ships, there was an increase in the area of living spaces, which are accommodated in the central part of the hull

and in the superstructure. Bunks are grouped in blocks of six and separated by light bulkheads. Sleeping enclosures are screened off from other living spaces. There are special rooms for lounging and studying.

The ship is adapted for operating under conditions of the use of mass destruction weapons. Portholes are entirely absent in the hull and superstructure and all inner spaces are equipped with an air conditioning system.

Belt conveyors and elevators are installed aboard the ship to transfer cargoes from the upper deck to lower decks and to move them through compartments. One belt provides for horizontal movement of cargoes for the entire length of the ship from bow to stern. Two receiving stations for cargo delivered by helicopters are set up in the bow and stern portions.

The modular equipment design makes it possible to use the unit repair method and rapidly replace unserviceable units by the ship's personnel and by the tender servicing her.

Automation over control of the ship's movement and maneuvering, weapon systems and the power plant permitted a reduction in size of the complement.

A fully variable main power plant was installed aboard the ship and is being used for the first time aboard U.S. Navy cruisers. Two General Electric LM2500 20,000 hp gas turbines operate on each shaft through a double-reduction gear with a splitting of power (an overall gear ratio of 21.4:1) through a coupler-uncoupler. At full capacity (3600 rpm), which they can develop 12 minutes after a cold start, the specific fuel consumption is 190 grams/hp·hr. Since all gas turbines have a right-hand rotation, port engines are located on the bow side of the transmission and starboard engines on the stern side of the transmission so the propellers rotate in different directions.

Each turbine is supplied as a single module (7.8 m long, 2.7 m wide and 2.85 m high), which includes, in addition to the turbine, a compressor, air intake manifold and gas exhaust manifold. Contained in a soundproof jacket, the module is installed on shock-absorbing mounts. Variable pitch propellers 5.2 m in diameter and with 168 rpm at full capacity are installed on the ship. The possibility of each turbine operating separately is provided in order to reduce fuel consumption.

The main power plant occupies four compartments along the length of the ship. The first and fourth contain the gas turbines with reduction gears, and the second and third the auxiliary equipment.

Alternating current (60 Hz) produced by three 2500 kw gas-turbine generators, is used for the shipwide network. Each gas-turbine generator is made as a single unit (gas-turbine, power generator, reduction gear) and housed in the first and fourth power compartments and in the stern portion of the ship. The main power plant is served by 54 persons, with five standing watch.

There is a system of remote control of the GEU, auxiliary machinery, steering arrangement, and power generation unit. Movement control is accomplished by a

governor for the machinery on each side, which changes propeller pitch and speed from panels accommodated on the bridge, on bridge extensions, or at the power plant central control station (TsPU). The TsPU is accommodated on the first platform deck in the well-protected central portion of the ship. The GEU can be controlled manually from there and from local stations in the first and fourth compartments. Automatic and manual control of the power generation unit, including the switching of gas-turbine generators, is done from the TsPU. All data from 300 sensors describing the GEU's operation are reflected on 128 displays and input to the EVM [electronic computer] for analysis, processing and output of recommendations. This information is displayed at control consoles and if necessary sent to a printer. Light and sound signals are given when the values of monitored parameters deviate from normal.

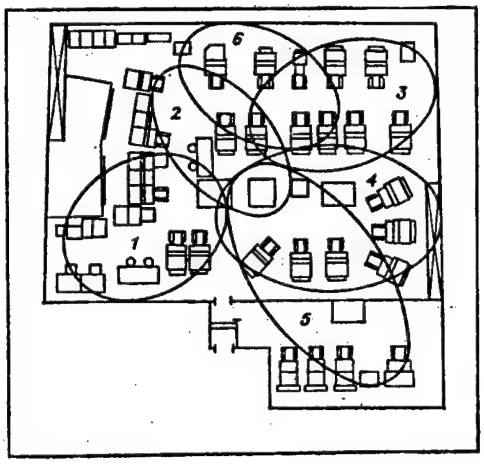


Fig. 2. Layout of functional zones in the combat information center:

1. Control console of ship striking force commander
2. Ship commander's control console
3. Air defense weapons control console
4. Antiship weapons control console
5. Antisubmarine weapons control console
6. Tactical situation display devices

The cruiser's combat information center (BIP) is accommodated on platform deck 01 in the bow portion of the superstructure, which raises doubts in foreign specialists as to its sufficient protection and survivability. It is divided into six functional zones (Fig. 2), where equipment (consoles, displays) is installed for subsystems providing for collection, analysis, generalization and display of information for decisionmaking on use of weapons against submarines, airborne targets and surface combatants, and for monitoring the tactical situation and controlling the actions both of a single ship and of the entire force.

The "Ticonderoga" guided missile cruiser is outfitted with the Aegis Mk 7 multifunction weapons system, which includes the Standard-2 RIM-66C surface-to-air guided missiles (with a range of fire around 37 km), two Mk 26 general-purpose launchers (two rails) accommodated in the bow portion of the ship and in the stern portion of the superstructure (unit of fire 64 missiles), a controllable AN/UYK-7 EVM, and the AN/SPY-1A radar with four phased antenna arrays accommodated on the forward, side and rear walls of the superstructure (Fig. 3). It has been reported that the radar provides an all-around scan and the detection and tracking of more than 100 targets. Foreign specialists emphasize that the AN/SPY-1A radar can discriminate false targets by the nature of the reflected signal and has a shorter reaction time and greater electronic countercountermeasures than other radars, it can control the fire of the Harpoon PKR [antiship missile], and it can vector fighters operating from carriers.

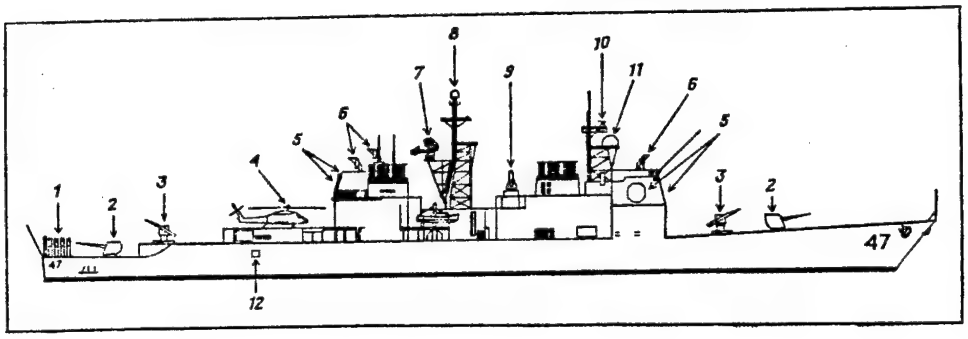


Fig. 3. "Ticonderoga" guided missile cruiser:

1. Harpoon PKR launcher
2. Mk 45 127-mm gun mount
3. Mk 26 general-purpose launcher
4. LAMPS Mk 3 ASW helicopter
5. AN/SPY-1A radar antennas
6. AN/SPG-62 illuminating radar antennas
7. AN/SPS-49 long-range air search radar antenna
8. TACAN RNS antenna
9. Vulcan/Phalanx 20-mm gun system
10. AN/SPS-55 navigation and sea-search radar antenna
11. AN/SPQ-9 radar antenna
12. Mk 32 torpedo tube firing port

Other key elements of the Mk 7 system include the following subsystems: control and monitoring, which provides the ship and ship striking force command elements with necessary data on the tactical situation; weapons control, which determines potentially dangerous targets, distributes them optimally among various weapons systems, produces recommendations for opening fire, and issues commands to the illuminating radar on the final leg of the missile's flight path; automatic monitoring of readiness and detection of malfunctions in electronics.

The shipboard electronic system totals 16 AN/UYK-7, 11 AN/UYK-20 and one AN/UYK-19 EVM. Two AN/SPG-62 illuminating radar antennas are located above the flying bridge and two above the hangar.

The ship has two LAMPS Mk 3 SH-60B helicopters for ASW, which also can be used for target designation, reconnaissance, search and rescue operations, and for transporting cargoes. Their hangar, which has a somewhat greater length than aboard "Spruance" Class destroyers, is located behind the mainmast. A take-off and landing pad fitted with the RAST system for safe landing of helicopters on the deck, adjoins the hangar.

Ports are located in the ship's hull abeam of the hangars through which Mk 46 torpedoes are fired from two Mk 32 324-mm triple torpedo tubes, installed on the sides beneath the upper deck.

The ship also is fitted with the ASROC antiship guided missile (with a range of fire of 9 km and a unit of fire of 24). There is the Mk 116 system with the AN/UYK-7 EVM for controlling antisubmarine weapons. The EVM produces firing data on the basis of information coming from the ship's AN/SQS-53 sonar. Operating in the echo ranging and direct-listening modes, as well as the underwater communications mode, the sonar provides for the detection, identification and tracking of several targets simultaneously. It is used together with the AN/SQR-19 underwater listening device which has a towed antenna array.

The ship's gun ordnance is represented by two 127-mm turret gun mounts and two Vulcan-Phalanx 20-mm gun systems. Lightweight automatic general-purpose Mk 45 127-mm turret gun mounts are accommodated in the bow and stern portions of the ship. The mount's weight was reduced to 20 tons by extensive use of aluminum alloys and new grades of steel in the designs of these facilities. The gun mounts use contactless switches, semiconductor amplifiers, electrical and hydraulic interlocks, and modular units which permit rapid detection and elimination of malfunctions. The drum magazine containing 20 quick-firing fixed rounds (each weighing 32 kg) provides for automatic fire since the magazine is continuously filled with a loading device to which the rounds are delivered manually. The mount's rate of fire is 20 rounds per minute and the firing range is 24 km. Rocket-assisted projectiles as well as projectiles with laser or infrared homing heads can be used.

The Mk 86 system has been installed aboard ship to control gunfire. It includes an EVM and set of changeable software modules, which allows using the system for controlling fire against airborne, waterborne and shore targets in a varying combat situation. It has the AN/SPQ-9 radar with an antenna located on the foremast under a protective fairing.

The central portion of the superstructure accommodates the Vulcan-Phalanx 20-mm gun systems (a rate of fire of 3,000 rounds per minute, belt feed, magazine capacity 950 cartridges). Acquisition and tracking radars are used in the fire control system. They are made in a single unit with the mount and operate in the pulse Doppler mode. They provide for detection of a target with a radar cross section of 0.1 $m^2$ at a distance up to 5,000 m, tracking the flight of the projectile and automatic fire adjustment. Foreign specialists include among the system's deficiencies the low magazine capacity, which is reloaded manually and takes 7-10 minutes.

The Harpoon antiship missiles (with a firing range of 120 km), accommodated in two eight-canister (according to other foreign sources, four-canister) launchers in the ship's stern, are intended for combating surface ships. The missile's low-level flight is supported by the AN/APN-194 short-pulse radar altimeter.

The first five ships will have the above ordnance. On all subsequent ships it is planned to install two EX-41 vertical missile launchers (in the bow and stern portions). The installation will contain eight identical modules of eight missiles each. Three cells in one module are occupied by a loader. The foreign press notes that use of this installation permits increasing the

system's survivability, expanding the nomenclature of missiles, increasing the magazine capacity by 50 percent, and reducing the reaction time and number of servicing personnel. After the Tomahawk cruise missile is made operational, 12 such missiles will be launched from this unit.

According to western press data, in addition to the above, the ship's electronics include the AN/SPS-55 navigation and sea-search radar (3 cm band) with an antenna on the foremast; AN/SPS-49 long-range air-search radar (decimeter band) with a large antenna array on the mainmast; the TACAN RNS; satellite navigation system equipment; radio direction finder; fathometer; RTR [electronic intelligence] system and radio communications system in the VHF, HF, MF and LF bands; the AN/SLQ-32 EW complex with Mk 36 launchers for the 127-mm missiles fitted with chaff and infrared decoys; and the AN/SLQ-25 sonar countermeasures set. A lengthy program for modification of the first ship in the series was drawn up simultaneously with their construction, and is to be performed in phases. The second ship ("Yorktown") differs slightly from the lead ship. It has been reported that some additional steps to increase survivability will be taken initially on the third ship, the CG49, and then on the first two.

In the first phase it is planned to improve the tactical situation display equipment of the combat information center and automate a number of processes in EW equipment, modernize the NTDS to make it compatible with similar naval systems in other NATO countries, and arm the ships with the improved Standard-2 surface-to-air missile for the ships CG49-CG51. In the second phase the ships CG52-CG56 are to be the first to receive vertical launchers and somewhat improved EVM's. They will not be equipped with the AN/SPS-49 radars, which also will be removed from the first five ships. In the third phase it is planned to install aboard the CG57-CG62 a lightweight version of the AN/SPY-1B radar (3,600 kg as opposed to 5,450 kg for the modification of the AN/SPY-1A) and a device for coupling the radars of several ships for a display of the tactical situation aboard ships with the Aegis system. From number CG57 on it is planned to include the Tomahawk cruise missile (previous ships also will be fitted with them) and to replace the AN/SPY-1A with the AN/SPY-1B radar. Steps of the fourth phase (beginning with the cruiser CG63) have not yet been defined in detail. Foreign specialists note as among the most significant steps installation of a new modification of the EVM with indicators which are 4-6 times better than for existing AN/UYK-7 machines.

After the "Ticonderoga" guided missile cruisers became operational the foreign press published a number of articles with a critical evaluation of the new ship series. Above all the articles noted the increased displacement in comparison with the design displacement (from 8,900 to 9,600 tons), which approaches the limit (10,200 tons) for the given hull. This is explained by the fact that the weight of the vertical launcher is 225 tons greater than for the Mk 26 launchers. It is also pointed out that the weight of the AN/SPS-49 radar, which is a back-up in case the AN/SPY-1A goes out, is 17 tons (at the same time, as foreign specialists note, it will not be able to replace the AN/SPY-1A radar even partially inasmuch as it does not determine the flight altitude of an airborne target). As a result the center of gravity shifted 0.152 m higher, which led to a decrease in the ship's metacentric stability

and reduced what was even without that the small reserve buoyancy. At least 70 tons of ballast were added to compensate for this negative effect. The increase in displacement reduced the ship's range, which would require an additional 150 tons of fuel to keep it at the previous level. Since the power plant was unchanged, fears are expressed that the cruiser will not be able to maintain the speed needed to perform the mission of escorting carriers proceeding at full speed. Everything together, emphasizes the foreign press, will have a serious effect on the tactical capabilities of the new ship.



6904
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# ASW HELICOPTERS OF THE SWEDISH NAVY

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 1, Jan 84 (signed to press 5 Jan 84) pp 88-89

[Article by Capt (Res) G. Nikolayenko]

[Text] The Swedish Navy has the HKP4 (Vertol 107, see figure [figure not reproduced]) ASW helicopter of American manufacture and the HKP6 (Agusta-Bell 206) of Japanese manufacture in the inventory. Organizationally they are included in two squadrons, which also have several Alouette II helicopters for training flights.

The first squadron (with approximately 200 persons) is stationed south of Stockholm. Its zone of operational responsibility includes the coastal region extending north right up to the state land border. The squadron has six HKP4 helicopters (three were purchased in the United States in 1963 and the others were built under a license by the Japanese firm of Kawasaki and delivered in 1973), and six HKP6's. It is noted that this is a forward-based combat squadron in which all pilots are well trained for flying helicopters of both types. Nevertheless, a special simulator was purchased in 1982 for maintaining a high level of helicopter crew training.

The second squadron is stationed in the vicinity of Goteborg with a zone of operational responsibility taking in Sweden's southern and western coastal regions. The squadron includes four helicopters each of both types (including the HKP4 of the Kawasaki firm). The personnel number approximately 150.

The squadron has a pilot training base. They initially undergo 6-7 years of general training, then take a flight training course. Before beginning to fly helicopters the pilots must have flown some 60 hours aboard aircraft of the Swedish Air Force.

The flights initially are made in the Alouette II helicopters (40-50 hours) and then in the HKP6 (one year). Each year six persons take the flight training course in the HKP6.

Almost five years are required to develop a highly skilled pilot, during which time the pilot spends some 1,000 flying hours in the air (figuring 200 hours a year as the pilot or copilot). Only after the pilot has flown an additional 200-300 hours (approximately 1-1½ years) in the HKP6 helicopter can he be recommended for flying the HKP4. It is emphasized that the overall training period for a highly skilled pilot for Swedish antisubmarine helicopters is a minimum of 12 years.

Each squadron has the following organizational structure: commander and staff, as well as three groups--flight personnel, maintenance (TO) and major overhaul.

The TO group is responsible for daily periodic technical servicing and current helicopter maintenance, including weaponry and electronics.

The major overhaul group monitors the technical condition of all the squadron's helicopters and performs major overhauls on them with the exception of the engine and main rotor blades, which are sent to a central base.

As the foreign press notes, the HKP4 helicopter meets the demands of the Swedish Navy to a considerable extent. It is equipped with two engines with a total output of 2,700 hp and can carry cargoes with a total weight up to 3,800 kg (or 26 persons) to a distance up to 850 km at a cruising speed of 240 km/hr. A fuel reserve greater than in its American prototype increases flight range, which has a duration of 5.5 hours.

This helicopter's airborne equipment includes the DUAV-4 search sonar of the French firm of Alcatel and the Swedish PEAB 9TC302 combination control system. Weapon variants include four small Type 42 torpedoes, mines and depth charges.

The DUAV-4 active-passive directional sonar has been in the helicopter inventory for five years. It differs from the French sonar by the fact that it uses a sound velocity meter of Swedish design. The submersible antenna is equipped with controllable surfaces which automatically keep it in a given attitude despite underwater currents and other water movement.

The REAB 9TC302 combination control system includes the 9HCI200 radar of the REAB firm intended for guiding RBS15 antiship missiles, and the 9TC302 torpedo fire control system of the TORCI firm, which supports the launch of four Type 42 torpedoes.

The naval command plans to make a more improved combination system operational by 1985, in which the radar will be replaced while the torpedo fire control system will remain the same. The new combination system will be coupled with ELINT and EW facilities and possibly will be associated with an identification device responder.

The HKP4 crew consists of two pilots, an observer (who performs the functions of coordinator and radar operator) and a technician (he controls the winch of the dipping sonar, and the radar antenna manually).

The HKP6 helicopter has one 317 hp engine which provides a cruising speed of 214 km/hr with a maximum flight duration of four hours. Four other persons can be carried aboard in addition to the pilot.

The foreign press notes that the Swedish naval command decided to reinforce antisubmarine helicopters with the "Stockholm" Class guided missile patrol boats in order to improve the ASW system. After being fitted with appropriate equipment, the patrol boats will be able to participate in hunting submarines.



6904
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## ARMY PAPER REVIEWS MOVIE ON AFGHANISTAN

PM190828 Moscow KRASNAYA ZVEZDA in Russian 18 Apr 84 Second Edition p 3

[Article by Hero of the Soviet Union Major R. Aushev under the rubric "On the Television Screem": "Who Is Firing on the Republic?"]

[Text] It so happens that I have seen this movie several times. I saw it on the first channel of central television and my comrades--students at the M.V. Frunze Military Academy. I have attended showings of the movie to party workers, students, and sportsmen...and each time, when the lights have gone up in the auditorium with the final frames, I have noticed people's faces. The movie has left on them--on all of them without exception--an imprint of grave, profound anxiety. The filmed story has made them think, forced them to worry, filled their hearts with anger.

The makers of the movie "Who Is Firing on the Republic?" (script writer V. Snegirev and producer M. Kayumov) set themselves a complex task--describing the enemies of the April Revolution in Afghanistan and showing on the screen those who are to blame for the fact that there has been bloodshed, that explosions have been thundering, and orphans crying for nearly 6 years now. The movie, made at the Uzbekistan documentary and popular scientific movie studio, is unique in this respect.

The movie traces the criminal link between the ringleaders of the bandit formations and the world reaction and reveals the true aims of the basmaches who hypocritically call themselves "the defenders of Islam." Whatever garb the enemies of the April Revolution may don, all their actions are aimed at placing on Afghanistan the yoke of medieval backwardness and dependence on imperialist.

The movie's makers, using Western newsreel footage shot "on the other side of the barricades," show the enemy of the revolution on a broad scale. The movie's main "hero" is the latterday basmach, trained by Western instructors, bought with dollars, armed with plastic mines and grenade-throwers produced in the United States, Britain, and the FRG.... Here are the dushmans attacking a convoy transporting civilian freight. Here they are blowing up apartment blocks. They are shooting captured Afghan soldiers at point-blank range. They are burning and menacing. They are sowing terror and death. These scenes cannot leave anyone indifferent.

Fulfilling their international duty in the limited contingent of Soviet troops in the DRA, I saw with my own eyes the traces of these latterday vandals' crimes. But I also saw something else--the strengthening shoots of a new life, the people's determination to uphold the gains of the revolution, to build a new, democratic society. This determination is conveyed well by by the movie "Who Is Firing on the Republic?"

CSO: 1801/304 END